

SEPTEMBER, 1947

# Railway Engineering and Maintenance



## New Members OF AN OLD FAMILY

**IMPROVED HEADFREE JOINTS**

*for*

**T.R. and NEW A.R.E.A. RAIL SECTIONS**

EXHIBITOR

BRIDGE & BUILDING  
TRACK SUPPLY

STEVENS, CHICAGO  
1947

112 & 129 T. R.

115-132-133 A.R.E.A.

also 140 P.S.

ASSOCIATIONS



NEW FAMOUS  
TRAINS OF AMERICA

New Denver and  
Rio Grande  
Streamliner.

**straight  
down  
the line!**

**N**ew D. and R. G. W. Streamliners roll smoothly along the well maintained right-of-way. Good roadbed, well gauged tracks, correctly maintained joints are factors that contribute to ultimate economy in costs. But even smooth rolling traffic and other factors set up stresses that tend to loosen and reduce the tension in rail joint bolts.

A safety factor which many maintenance-of-way engineers depend on for rail joint security and to keep bolts **TIGHTER LONGER** under all conditions is Reliance Hy-Pressure Hy-Crome Spring Washers. Sufficient reactive

pressure inherent in every Reliance Hy-Pressure Hy-Crome Spring Washer compensates for bolt loosening as a result of wear. Specify Reliance Hy-Pressure Hy-Crome Spring Washers; have troublefree joint bolts on your railroad; keep your rolling stock going straight down the line.

*Write* **TODAY** for illustrated folder on Reliance Hy-Pressure Hy-Crome Spring Washers for track application.

*Edgemark  
of Quality*



**EATON**

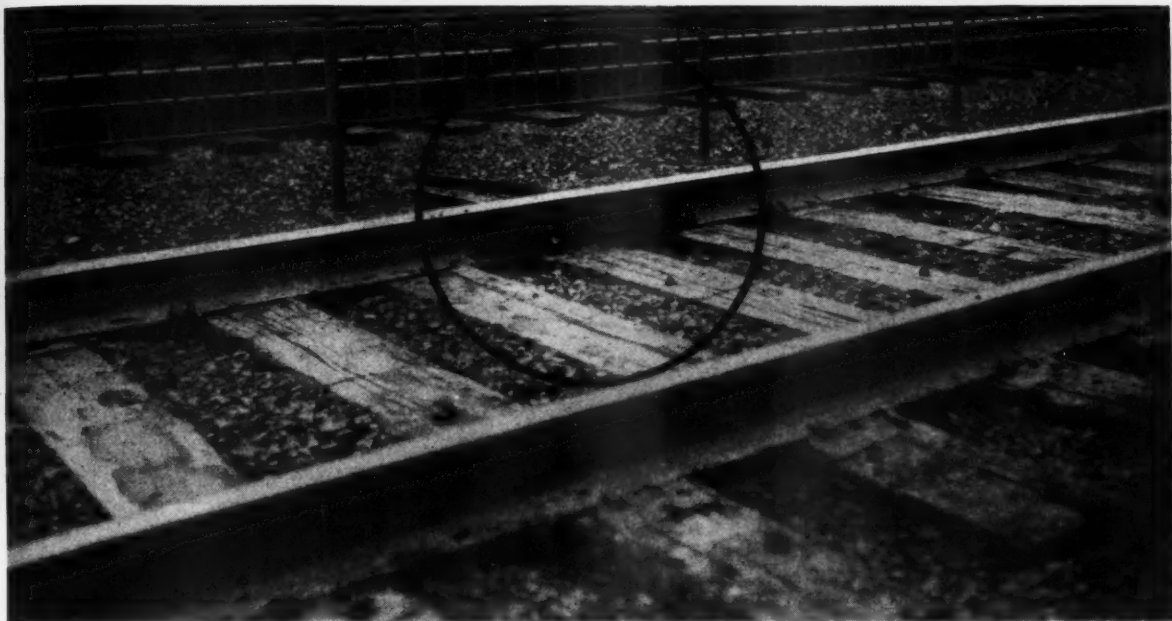
EATON MANUFACTURING COMPANY

OFFICES AND PLANT MASSILLON, OHIO

*Reliance Division*

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# The Safety-Plus Treatment in Track Maintenance



## Prevents Corrosion of Rail Joints Contributes to Safety

Seasoned railway maintenance men have long heeded the "ounce of prevention" maxim. For years now some of them have stressed the importance of NO-OX-ID on rail joints as a safety measure.

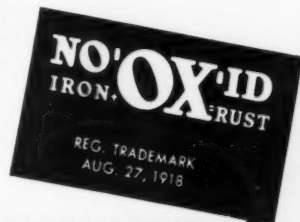
1. The job condition requires a material with positive rust-preventing qualities and which will also provide the required lubrication. NO-OX-ID meets the job condition.

2. The spacing of rails when laid to allow for rail movement through the range of atmospheric temperature at location truly functions as provided for when NO-OX-ID is used in the joint.

3. NO-OX-ID "A Special" applied as outlined in "Instructions for Applying NO-OX-ID to Rail Joints" insures the best in results for this difficult problem. Tables of quantities required accompany these instructions. Write for a copy of "Instructions for Applying NO-OX-ID to Rail Joints."

The **ORIGINAL** RUST PREVENTIVE

Dearborn Chemical Company  
Dept. U, 310 S. Michigan Ave., Chicago 4, Ill.  
New York • Los Angeles • Toronto





**STABILIZE ROADBED  
*THIS WAY***

**Get better results, greater savings**

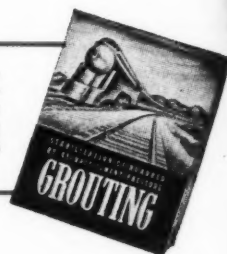
ASPHALT-CEMENT pressure grouting is now recognized by leading railroads as the most effective and economical way of eliminating "soft track". But the use of the *right asphalt* is necessary to assure maximum benefits. That is why the choice is *Texaco No. 24 Emulsified Asphalt* — an asphalt developed through field experience especially for this work.

An economical, *lean* grouting mixture with *Texaco No. 24 Emulsified Asphalt* assures easier, more thorough penetration and better seal. It helps waterproof the soil and keep it resilient . . . it can be applied in less time . . . and gives longer-lasting protection.

You'll also benefit by important savings — in first cost and in upkeep. Sections of track stabilized with

Texaco asphalt-cement pressure grouting show far lower costs for maintenance. The booklet at the right gives numerous examples. To get a copy, just call the nearest Railway Sales Division office listed below, or write The Texas Company, *Railway Sales Division*, 135 East 42nd Street, New York 17, New York.

SEND FOR this fact-packed, 16-page, illustrated book. Describes the development of asphalt-cement pressure grouting, outlines a practical working set-up, shows costs, tells benefits secured by a leading railroad.



NEW YORK • CHICAGO • SAN FRANCISCO • ST. PAUL • ST. LOUIS • ATLANTA



**TEXACO Emulsified Asphalt  
FOR GROUTING**

Tune in . . . TEXACO STAR THEATRE presents the TONY MARTIN SHOW every Sunday night. See newspaper for time and station.

*Putting it...* **WHERE** *you want it!*  
**WHEN** *you want it!*



Your Northwest brings you a combination of features that mean smoother, faster handling and higher output — a combination exclusively Northwest.

The "Feather-Touch" Clutch Control gives matchless smoothness of handling—the kind of smoothness that means spotting a bridge of timber or a concrete bucket. It gives ease of operation without complications, the feel of the load, and at the same time it eliminates the danger of shutdown due to control failures.

Uniform Pressure Swing Clutches are cool

**NORTHWEST**  
 1513 Field Building

**ENGINEERING**  
 135 South LaSalle Street

**COMPANY**  
 Chicago 3, Illinois

running, eliminate grabs and jerks when swinging and require the minimum of adjustment and replacement. Front-end cab and window design provides high visibility for high lifts or low. Boom Hoist operates under power both up and down and there is a choice of Boom Hoists to permit live boom operation, independent of other operations.

There are other features that you as a railroad man will be interested in—features that make the Northwest a better railroad machine. Plan ahead now to be Northwest equipped. Ask for details.

# NORTHWEST

THE ALL PURPOSE RAILROAD MACHINE  
 SHOVEL • CRANE • DRAGLINE • PULLSHOVEL



Proved on the Nation's  
 Leading Railways



# Modern Service

requires modern track  
maintenance



A basic necessity for delivering excellent service, day in and day out, with high speed trains like the *Southerner*, *Tennessean*, and other crack streamliners on the Southern's schedule is a well-maintained track. For modern track maintenance the Southern and more than 75 other Railroads use WOOLERY WEED BURNERS to keep their tracks weed free.



A SOLID WALL OF FLAME 25 FEET WIDE

## WOOLERY WEED BURNERS

5-burner, 3-burner, 2-burner  
and 1-burner models

### NEW MODEL PB WEED BURNER



#### THE NEW MODEL PB WEED BURNER

—May be mounted on a push car to be hauled by a track motor car for on-track use, or on a 1½-ton truck or two-wheel trailer for off-track service, and when not in service is easily removed and stored, releasing truck or push car for other work. Burns a 15-foot swath; with outside arms spread, burns to 25 feet by making second trip. Requires only two men to operate. Adjustable burner arms and individual flame controls. Adaptable as a snow melter.

Your inquiry will bring  
detailed information on  
cost and performance.

#### EXHIBITOR

BRIDGE & BUILDING  
TRACK SUPPLY

HOTEL STEVENS, CHICAGO  
SEPT. 12-16-17-18, 1947

ASSOCIATION

Be Sure to  
Visit Our  
Exhibit at  
Booths 71 and 72

## WOOLERY MACHINE COMPANY

MINNEAPOLIS Pioneer Manufacturers of MINNESOTA

### RAILWAY MAINTENANCE EQUIPMENT

RAILWAY WEED BURNERS • MOTOR CARS • TIE CUTTERS • TIE SCORING  
MACHINES • RAIL JOINT OILERS • CREOSOTE SPRAYERS • BOLT TIGHTENERS

EXCLUSIVE EXPORT REPRESENTATIVES: PRESSED STEEL CAR COMPANY, INC. PITTSBURGH, PENNA.



# He gives bearings a rub-down to put curves in the right places



*... for faster operation, greater accuracy, maximum load capacity*

**I**N the final manufacturing process, Timken T-type thrust bearings are assembled and processed so that the surfaces of the ribs, rollers and races are generated as a unit. The bearing thus becomes a "Generated Unit Assembly".

This extra process produces a smoothly-curved area of contact between the end of each roller and the cone rib against which it operates, so that the convex shape of the roll end and the concave surface of the cone ribs are identical in contour.

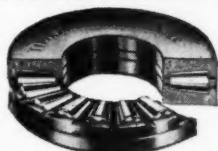
We developed this process years ago for thrust bearings which must operate under extreme loads with high roll and pressures against the cone ribs end since have adapted it to other Timken bearings, including those used for precision machine tools, steel mill and railroad equipment and other applications.

Today "Generated Unit Assembly" reduces friction and wear to the vanishing point; increases load capacity; assures positive roll alignment; eliminates the need of break-

ing-in or final adjustment on the job; and lengthens bearing life. It is one of the many reasons why it pays to have Timken bearings in every machine you manufacture or buy.

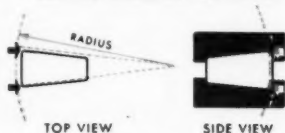
**REMEMBER,** Timken bearings are produced by the only bearing manufacturer in the country making its own steel and Timken is the acknowledged leader in: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. special analysis steels. The Timken Roller Bearing Company, Canton 6, Ohio.

**GENERATED UNIT ASSEMBLY**

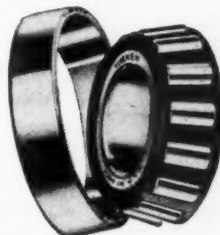


Extra manufacturing process makes Timken heavy duty thrust bearing a "Generated Unit Assembly".

**CURVED AREA RIB CONTACT**



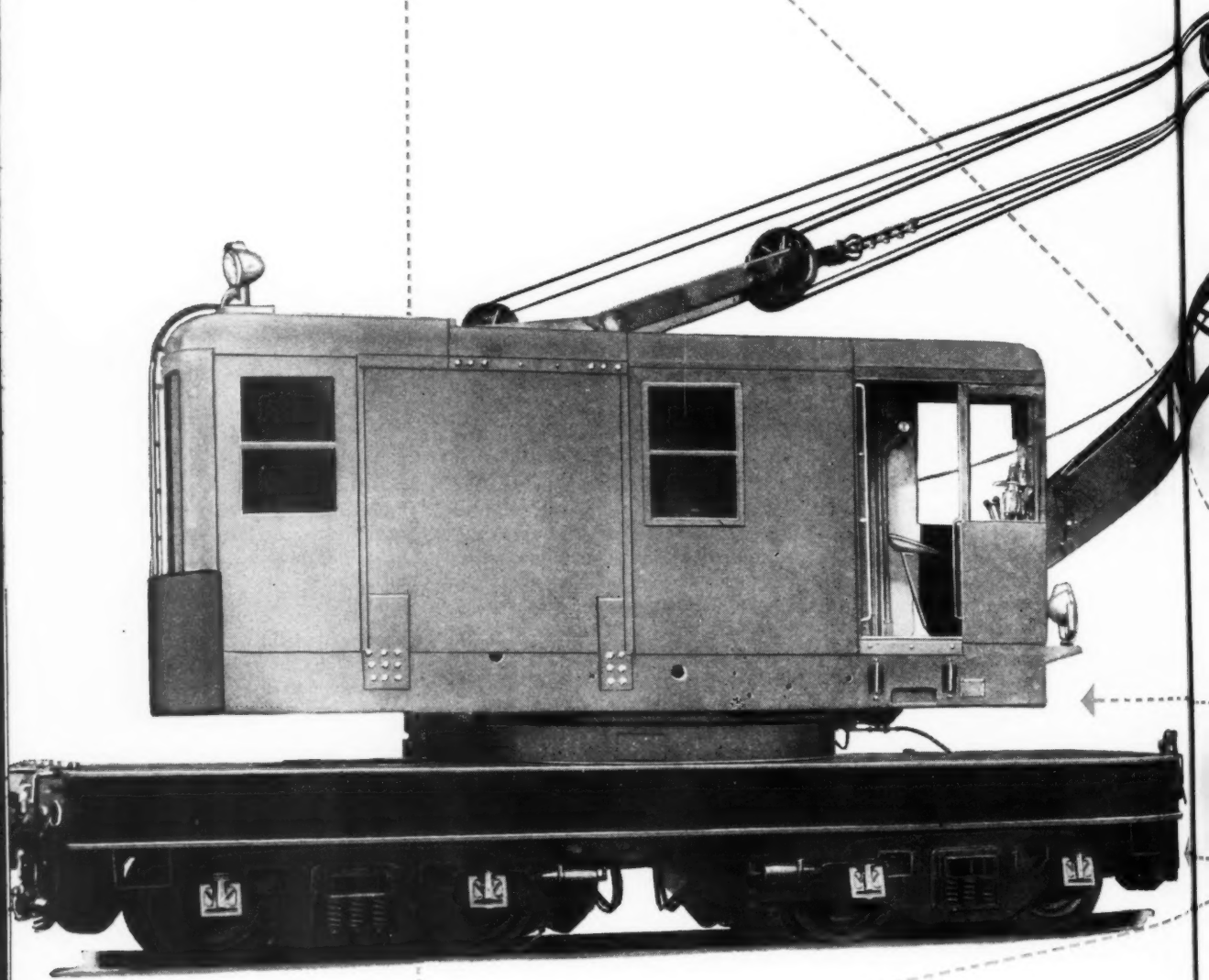
Curved area of roll end (at arrows) fits perfectly the curve of upper and lower ribs of this thrust bearing.



**TIMKEN**  
TRADE MARK REG. U. S. PAT. OFF.  
**TAPERED**  
**ROLLER BEARINGS**

NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION

# *A revolutionary* LOCOMOTIVE CRANE



DIESEL-ELECTRIC LOCOMOTIVE CRANE, PATENT NO. 2083460  
TOUCH CONTROL PATENT NO. 2370556

E



## THE AMERICAN DIESELECTRIC

**Climb into the cab** of this new locomotive crane . . . and feel *diesel-electric* power at your fingertips!

First, travel the crane along the rails. Feel the smooth surge of *electric* power driving the wheels—power that delivers maximum torque for heavy-pull starting—power that never jerks.

Now swing the boom and pick up a load. Here you feel direct *diesel* power at work . . . tremendous energy managed by precise air controls.

The American Dieselectric is not a converted steam crane, or gasoline crane. It is new in every part, from trucks to boom point . . . specifically created for the best utilization of diesel-electric power. Because of its tremendous work capacity and low upkeep, *it is one capital investment that "writes off" its own cost in 5 years.*

★ Would you like specifications, pictures, operating data? Write today for new illustrated catalog. AMERICAN HOIST AND DERRICK COMPANY, St. Paul 1, Minn. *Sales Offices:* New York, Chicago, San Francisco, Pittsburgh, New Orleans.

● *diesel* power to the deck...

● *electric* power to the trucks



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DESCRIPTIVE LITERATURE

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71 South Robert Street, St. Paul 1, Minnesota

Please send \_\_\_\_\_ copies of new locomotive crane catalog with details on the American Dieselectric

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City \_\_\_\_\_

Zone \_\_\_\_\_

State \_\_\_\_\_

# See how MONOTUBES reduce foundation costs *4 WAYS!*

JOB-WISE engineers and builders discovered long ago that Monotubes have *exclusive* advantages that pay off in time-savings, labor-savings and cost-reductions. Check these points—see how they can help *you*:

Monotubes' fluted, tapered construction speeds driving.

They're easily extendible, *right on the job*.

Their tubular design makes thorough inspection quick and easy, before concreting.

Light in weight, Monotubes are easily and quickly handled.

Any way you figure it, Monotubes can help you reduce foundation costs—can help you increase your profit-margin on every job. Available in gauge, size and taper to meet varying soil conditions. Send for complete information today. The Union Metal Manufacturing Company, Canton 5, Ohio.

THEY SPEED  
UP DRIVING!

QUICKLY  
INSPECTED!

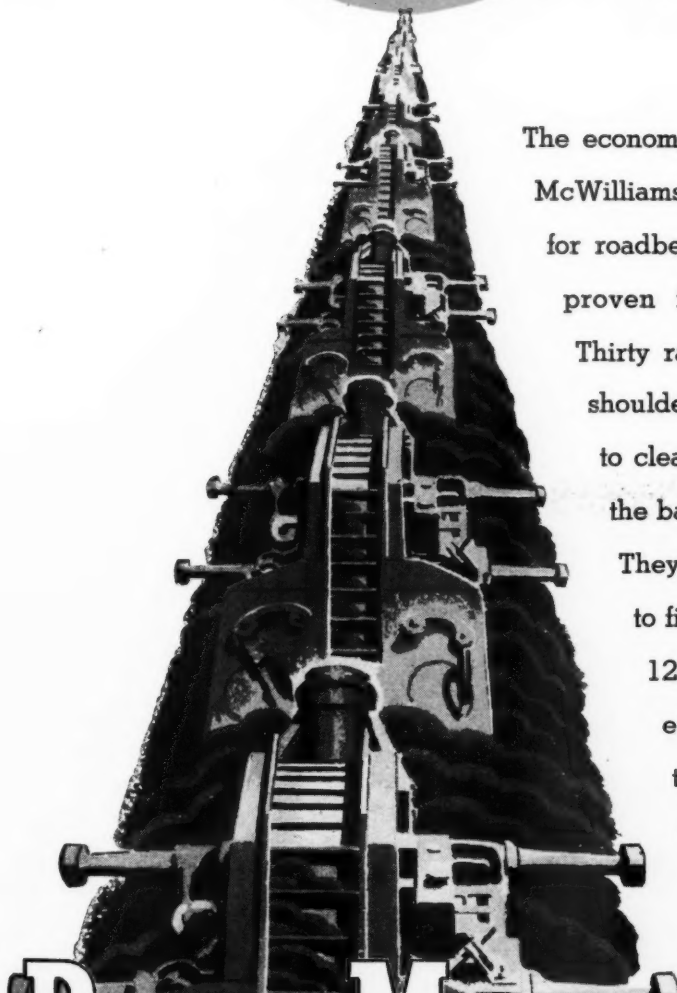
THEY'RE EASILY  
EXTENDIBLE!

EASILY  
HANDLED!

**UNION METAL**  
*Monotube Foundation Piles*



389  
McWILLIAMS MOLES  
USED BY  
30  
RAILROADS



The economy and efficiency of the McWilliams "Mole" Ballast Cleaner for roadbed maintenance is being proven in service every day. Thirty railroads use 389 of the shoulder and intertrack models to clean dirt and cinders from the ballast of their roadbeds. They find that a crew of four to five men can clean 850 to 1200 feet in 8 hours with either model without interference with train operations.

**RAILWAY MAINTENANCE CORP.**

PITTSBURGH 30, PENNSYLVANIA

MANUFACTURERS OF THE McWILLIAMS "MOLE" and RMC RAIL JOINT PACKING

# SPEED and ECONOMY on Wheels!

**GET ALL THE FACTS •**

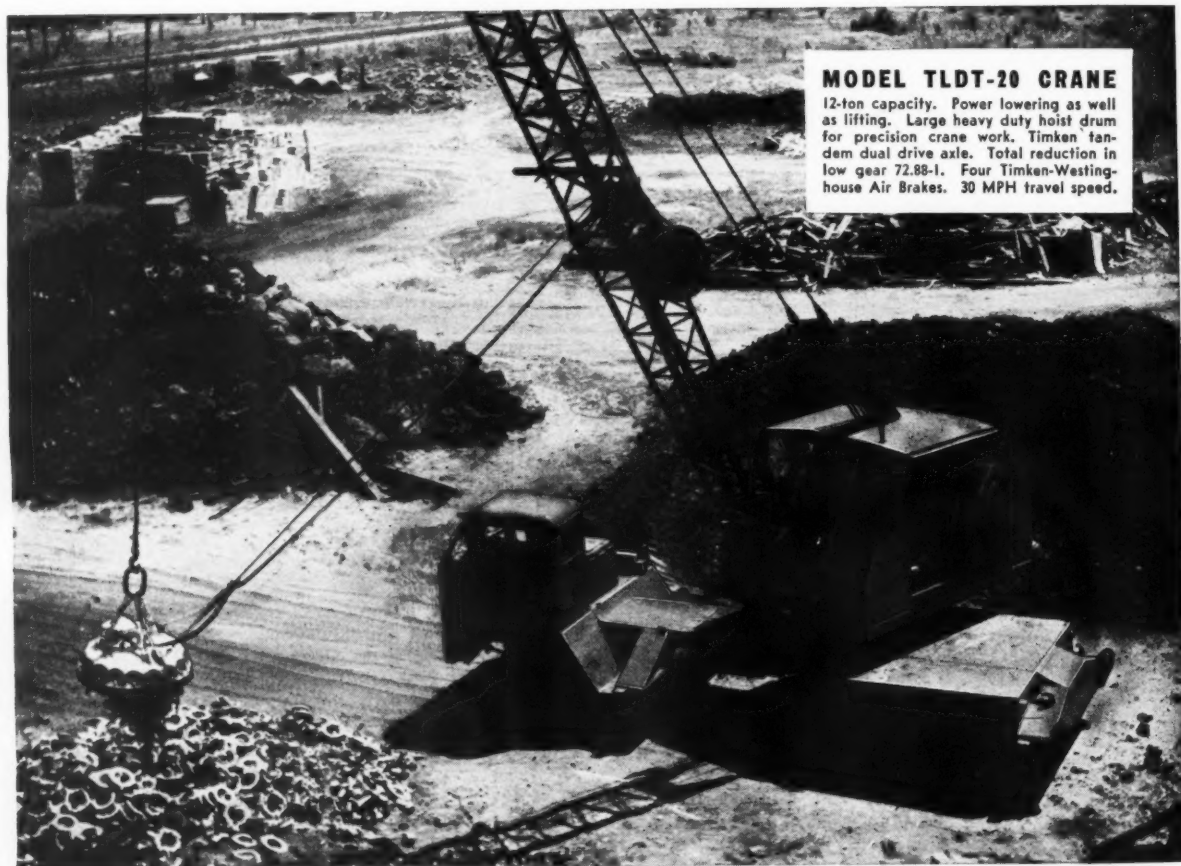
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**FINGERTIP AIR CONTROLS**

**3/8 YD. and 1/2 YD. SHOVELS**

**6 to 12 TON CRANES**

No waiting—no delays! Out on the job or around the yard MICHIGAN Mobile CRANE'S time-saving, cost-cutting operating speed, economy and truck mobility pays off on every lifting and excavating job. Long-time MICHIGAN owners will tell you that for crane, clamshell, dragline, trench hoe and shovel work the fully convertible MICHIGAN Mobile SHOVEL-CRANE is truly "speed and economy on wheels"!



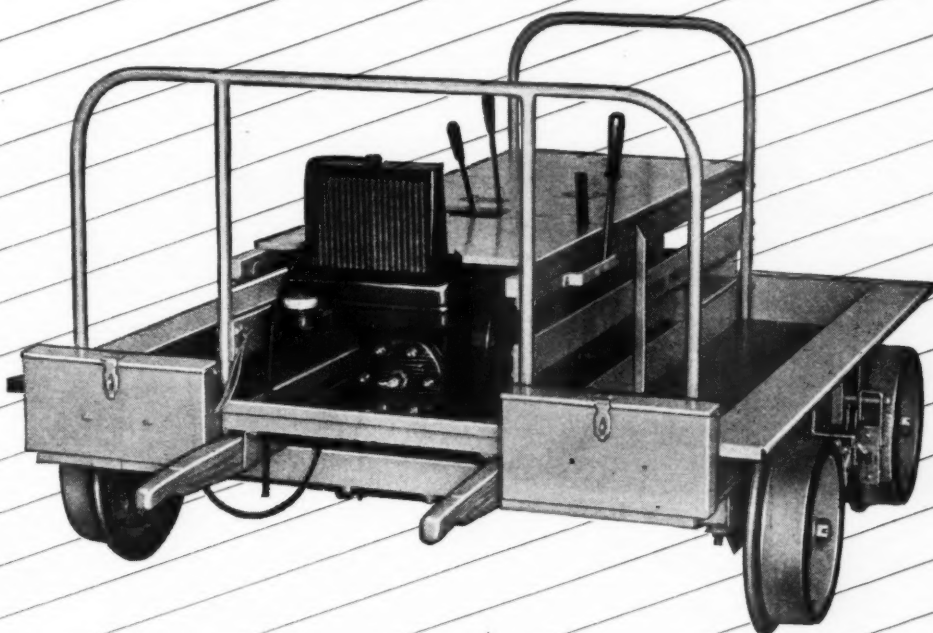
## MODEL TLDT-20 CRANE

12-ton capacity. Power lowering as well as lifting. Large heavy duty hoist drum for precision crane work. Timken tandem dual drive axle. Total reduction in low gear 72.88-1. Four Timken-Westinghouse Air Brakes. 30 MPH travel speed.

# MICHIGAN

POWER SHOVEL COMPANY

BENTON HARBOR, MICHIGAN



## IT'S LIGHT, IT'S FAST, IT'S SAFE

### Fairbanks- Morse 55D Motor Car

Yes, this versatile motor car has a combination of features that add up to real serviceability.

One man can handle it easily. While it weighs 690 lbs., rear lifting weight is only 95 lbs. Yet it is amply roomy and powerful for 8 men and their tools.

It has steel rail skids, alloy steel frame, all-steel battery and tool box. Five-gallon fuel tank supplies powerful 9-hp, water-cooled, single-cylinder engine. Low center of gravity gives maximum safety.

Write today for full information about this and other motor cars in the complete Fairbanks-Morse line. Fairbanks, Morse & Co., Chicago 5, Illinois.

## Fairbanks-Morse

*A name worth remembering*



Diesel Locomotives  
Diesel Engines  
Generators • Motors  
Pumps • Scales  
Magnets • Stokers  
Railroad Motor Cars  
and Standpipes  
Farm Equipment



Thousands of tests, under all kinds of service conditions, prove that "Dutch Boy" Red Lead gives metal extra protection

## 4 Ways RED LEAD RESISTS EFFECTS OF WATER ...guards against Rust

Maintenance engineers have long recognized Red Lead as the "standard" metal protective paint. This acceptance is based, to a great extent, on its marked ability to stand up against moisture, a powerful factor in the rusting process.

Now, scientific research into the inherent properties of the pigment itself, shows just how and why Red Lead resists the effects of water. Briefly, there are four reasons:

**1. Red Lead resists water "pick-up"**—If a series of various metal protective paint films are weighed and then submerged in water (salt or fresh), it is readily noticed, on reweighing after several days immersion, that Red Lead films have outstand-

**Testing Water Permeability of Paint Films**—With this standard apparatus a measure of the amount of water that passes through a unit of film is obtained.

Experiments show that a straight linseed oil film allows three times as much water to pass through the film as when the same film is pigmented with Red Lead.



ing resistance to the absorption, or "pick-up," of water.

**2. Red Lead resists passage of moisture**—Rusting of metal will not take place if water does not penetrate the paint film to reach the metal. Water permeability tests of paint films (see illustration at lower left) show, beyond question, that Red Lead is one of the most effective metal protective pigments, because of its stubborn resistance to the passage of moisture through the film.

**3. Red Lead resists solution by water**—The action of water on paint films results in a partial dissolving of the film. Many metal protective films lose a considerable percentage by weight of their films through solution in water. On the other hand, the solubility losses of Red Lead paint films are practically negligible.

**4. Red Lead resists distortion by water**—Red Lead films have little tendency to shrivel or change in size during immersion in water. This is imperative to good metal protection. For good protection depends on good adhesion, and a paint film maintains better adhesion when it is not distorted by the action of the water.

Remember, too, Red Lead is compatible with practically all vehicles commonly used in metal protective paints, including many of the fast-drying resin types.

**Specify RED LEAD for ALL Metal Protective Paints**

The rust-resistant properties of Red Lead are so pronounced that it improves any metal protective paint. So, no matter what price you pay, you'll get a better paint if it contains Red Lead.

\* \* \*

*The benefit of our extensive experience with metal protective paints for both underwater and atmospheric use is available through our technical staff.*

**NATIONAL LEAD COMPANY:** New York 6; Buffalo 3; Chicago 8; Cincinnati 3; Cleveland 13; St. Louis 1; San Francisco 10; Boston 6, (National Lead Co. of Mass.); Philadelphia 7, (John T. Lewis & Bros. Co.); Pittsburgh 30, (National Lead Co. of Pa.); Charleston 25, W. Va., (Evans Lead Division).



**DUTCH BOY**  
RED LEAD

# BROWNHOIST GIVES YOU MORE FOR YOUR MATERIAL HANDLING DOLLAR

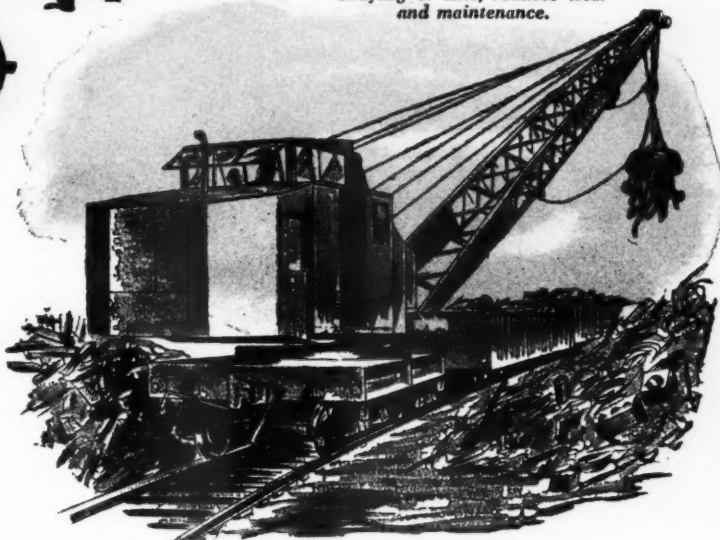
**360° VISIBILITY** from the patented Monitor-type cab assures safer, faster, easier crane operation. The operator can see in any direction at a glance. No blind spots, no awkward maneuvering, no dangerous guesswork.



**SMOOTH, EASY SWING** of the Brownhoist Diesel Locomotive Crane cab means an end to sudden grabbing which makes spotting of loads difficult. It minimizes hazardous swaying of lifts, reduces wear and maintenance.

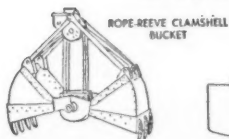


**HUSKY RUGGEDNESS** of construction from trucks to boom tip absorbs the shock and strain of capacity loads, helps keep maintenance costs to a minimum, makes the Brownhoist Diesel Locomotive Crane your best long-term investment in economical material handling.

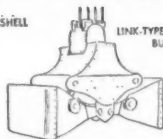


Join the long list of crane owners who are capitalizing upon the many Brownhoist engineering and construction advantages such as (1) 360° visibility; (2) positive response to air-operated controls placed within easy reach of the operator; (3) one-piece cast steel bed; (4) rotating and travel friction disc clutches with 1-point adjustment; and (5) 14" safety clearance between rotating bed and car body. Write for complete facts.

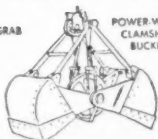
## BROWNHOIST BUILDS BETTER CRANES



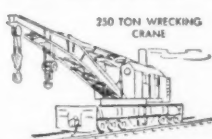
ROPE-REEVE CLAMSHELL BUCKET



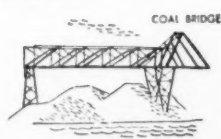
LINK-TYPE ORE GRAB BUCKET



POWER WHEEL CLAMSHELL BUCKET



250 TON WRECKING CRANE



COAL BRIDGE

**INDUSTRIAL BROWNHOIST CORPORATION • BAY CITY, MICHIGAN**

DISTRICT OFFICES: NEW YORK, PHILADELPHIA, CLEVELAND, CHICAGO • AGENCIES: DETROIT, BIRMINGHAM, HOUSTON, DENVER, LOS ANGELES, SAN FRANCISCO, SEATTLE, VANCOUVER, B. C., WINNIPEG, CANADIAN BROWNHOIST LTD., MONTREAL, QUEBEC,

# *Railway Handyman!*

## **THE INTERNATIONAL TD-14 DIESEL**



International Diesel Crawlers make themselves useful all along the line. They dress grades, clear land, move earth for spurs or other trackage extensions and, when equipped with track-walking shoes, cut the cost of many on-rail jobs.

In the picture above an International TD-14 is clearing the area for placement of machinery on a tunnel construction job. It built the roads leading to the tunnel entrance and was the dependable "handyman of hard work" on the project.

Quick to start in any weather, easy on fuel

and lube oil, and requiring little maintenance, International Diesel Crawlers keep costs at minimum levels for the amount of work they do.

Consult the International Industrial Power Distributor near you for further facts about these power-packed tractors and the matched equipment available with them.

*Industrial Power Division*



**INTERNATIONAL HARVESTER COMPANY**

180 North Michigan Avenue

Chicago 1, Illinois

# **INTERNATIONAL POWER**

**CRAWLER AND WHEEL TRACTORS • DIESEL ENGINES • POWER UNITS**

## For UNDERLAYMENT...



## For UTILITY FLOORS...



## *More for your money with Asphalt Mastic!*

Here's an *all-round* flooring material. Cold-laid Asphalt Mastic made with Flintkote Flooring Emulsions, for heavy duty floors and for underlayment.

Mastic underlayment adds resilience to any floor. It provides an ideal base for the finish floor. And it's particularly good for reflooring jobs, because it can be used over almost any clean, firm base.

In waiting rooms, office spaces . . . anywhere you want to spruce up a bit with a decorative flooring, make sure of a better floor by using a *mastic* made with Flintkote Flooring Emulsions.

\* \* \*

For shops, station platforms and the like . . . where floors take a beating . . . install heavy duty mastic floors made with Flintkote Flooring Emulsions.

These durable floors are quick and easy to apply over wood, steel, concrete or almost any other firm base . . . either by power float (for large areas) or by hand application (for



small spaces). Use this type for resurfacing or new construction.

Maintenance? You can almost forget it. Mastic Floors made with Flintkote Emulsions are self-healing of minor scars and rutting. Withstand heaviest traffic without damage.

And because these floors are dustless, resilient, shock-absorbing and sound-deadening, they help provide clean, comfortable, quiet working conditions.

\* \* \*

Get complete information on Flintkote Flooring Emulsions. Write today, and ask us to tell you how you can get more for your money with asphalt mastic.

## **FLINTKOTE** *Products for Industry*

THE FLINTKOTE COMPANY, 30 Rockefeller Plaza, New York 20, N. Y.  
ATLANTA • BOSTON • CHICAGO HEIGHTS • DETROIT • LOS ANGELES • NEW ORLEANS • WASHINGTON • TORONTO • MONTREAL

**Don't Tolerate  
LOSS OF TIE LIFE  
from CHECKING and  
SPLITTING**



EXHIBITOR  
**BRIDGE & BUILDING  
TRACK SUPPLY**  
HOTEL STEVENS, CHICAGO  
SEPT. 15-16-17-18, 1947

## It's Greater Than You Think

**N**EARLY 50% of creosoted oak tie failures are due to checking and splitting. This is the finding in two recent inspections by a group of impartial experts of ties removed from the tracks of two Southeastern Railroads.

Vapor-Dried\* Oak ties in test track for four years show marked reduction in number, size and extent of checks and splits compared with air seasoned controls.

Vapor Drying also:—

- (1) Assures deeper penetration and better distribution with less preservative.
- (2) Eliminates losses from checking, splitting and decay during seasoning.
- (3) Reduces inventories and therefore insurance, interest, etc.
- (4) Requires no vast seasoning yards.
- (5) Effects savings in many treating plant costs such as handling, switching, watchmen, etc.

See our Animated Display at the Track  
Supply Association Exhibit in Booth No. 53.

\*Process Pat'd.



**TAYLOR COLQUITT CO., SPARTANBURG, S. C.**

## ADDITIONAL INFORMATION

***On Any of the Products Mentioned in This Issue***

Below is a complete index of the products referred to in both the editorial and advertising pages of this issue. If you desire additional information on any of them, use one of the accompanying addressed and stamped postcards in requesting it. In each case give name of product and page number. The information will come to you directly from the manufacturer involved, without any obligation on your part.

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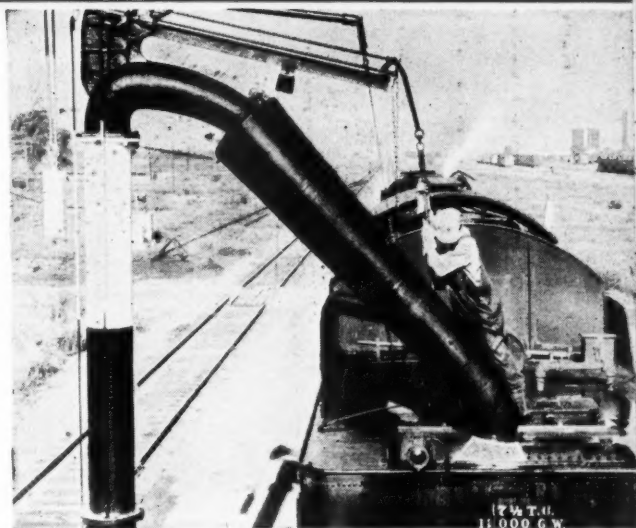
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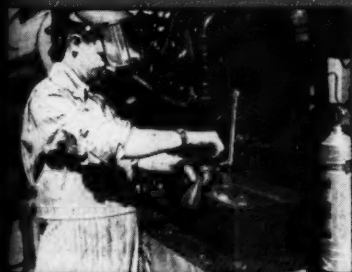
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Electrically operated gear on yoke king-pin steers Tournapull and Scraper as one integral unit . . . keeps rig rolling in desired direction at all times . . . enables the operator to turn 90° right or left at the touch of a button. This means faster handling with increased safety and maneuverability. Short turning radius saves jockeying back and forth on narrow grades.



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# NEW "C" TOURNAPULL

**11 YARDS**  
**STRUCK CAPACITY**



## Increased flotation and traction

The new "C" Tournapull gives you extra flotation because big tapered bead tires permit lower pressures . . . more ground contact. You also get improved, sure-footed traction because revolutionary new type differential makes one drive wheel pull 4 times harder than the other before it will slip . . . automatically supplies most power to the wheel on firmest footing.



## Finger-tip electric control

On the modern Tournapull all operations are electrically controlled by individual motors — with centralized finger-tip control from dashboard. Makes entire operation faster . . . easier on operator . . . easier on machine . . . easier to control accurately. These motors — new AC type with lugging characteristics of DC motors — are specially designed for earthmoving service.

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These finishes produce uniform brilliant aluminum coatings with excellent durability. They dry quickly and positively even under adverse drying conditions and show a minimum of dirt collection. They are highly water resistant and may be used where high humidity prevails.

**Pittsburgh Aluminum Paint** is suitable for both interior and exterior appli-

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# GRADALL

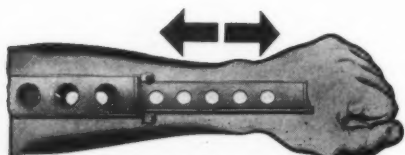
## BRINGS NEW VERSATILITY-DEXTERITY-PRECISION to the Railroad Maintenance Field

**AN ENTIRELY NEW DEPARTURE IN DESIGN PRINCIPLES** gives the new Gradall flexible "Arm Action" for fast, accurate work on many different railroad maintenance jobs. The telescoping, hydraulically powered boom of the Gradall has armlike dexterity—it reaches and pulls, tilts and turns.

**"ARM ACTION" GIVES GRADALL VERSATILITY** for fast work on a variety of off-track jobs. Gradall is mounted on a heavy-duty truck chassis—can be driven from job to job at truck speed—expense of hauling several kinds of heavy equipment is avoided.

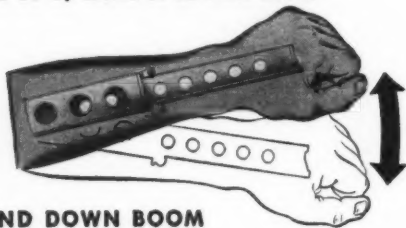
**"ARM ACTION" GIVES GRADALL** the ability to work close to walls and curbs, around switch and signal boxes or poles and trees, under low hanging wires and in many other close quarters.

**"ARM ACTION" GIVES GRADALL PRECISION** for cutting sheer walls or perfectly graded slopes—produces neat, clean jobs to eliminate or minimize hand clean-up work. Designed by a contractor and built by makers of precision machinery, Gradalls are proving to be real money savers on the wide variety of jobs encountered in railway maintenance service.



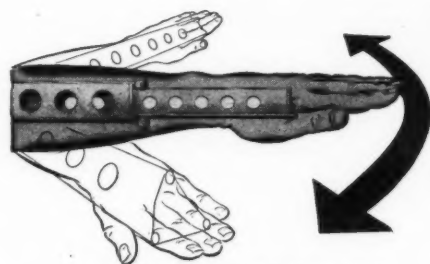
### IN AND OUT BOOM

The Gradall's 12' boom extends hydraulically to 24' by means of an inner boom.



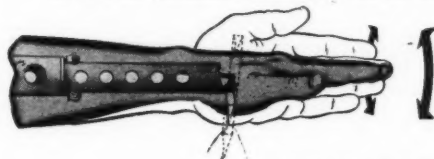
### UP AND DOWN BOOM

The boom of the Gradall can be raised 22° to a dumping height of 14' 10", or lowered 44° to a digging depth of 10'.



### FULL 360° BOOM SWING

A well-balanced platform with smooth revolving action permits a full 360° boom swing.



### TILTING BOOM

The Gradall boom can be tilted 45° each way from horizontal, permitting slope grading to smooth contours.



### TOOL CONTROL

Tools can be held in any position through a vertical arc of 116°.



### GRADALL 'Arm-Action' DOES ALL THESE JOBS WITH EASE AND PRECISION

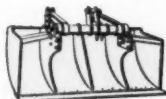
- Trench Digging
- Widening Cuts and Fills
- Excavating
- Restoring Embankments
- Ripping and Loading Old Paving
- Ditch Cleaning
- Sloping and Grading
- Back Filling
- Snow Removal and Loading

#### LESS THAN 15 MINUTES TO CHANGE ATTACHMENTS!

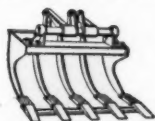
A variety of standard and special tools are quickly interchangeable by simply loosening two hex nuts and withdrawing a pin. Shown here are only a few of the standard tools. Many more are available.



48" Cleanup Bucket;  
72" Bucket for snow removal



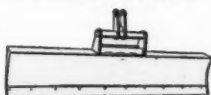
72" Ditch Cleaning Bucket



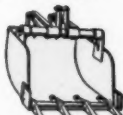
47" Pavement Removing Bucket



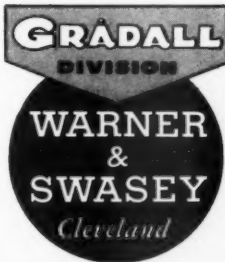
Pavement Ripper



8'0" Blade—Furnished with plain and serrated cutting edges



32" Digging Bucket;  
36" Digging Bucket



Gradall Reg. U.S. Pat. Off.

BRIDGE & BUILDING  
TRACK SUPPLY

ROUTE 10, CHICAGO  
SEPT. 12-16-17-18, 1947

#### SEND THE COUPON

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Please send more information about the Gradall Multi-Purpose Machine.

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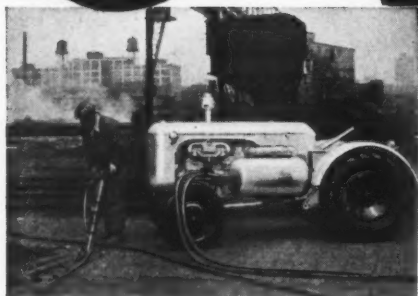
N-347



# LE ROI "TRACTAIR"

(BUILT BY THE MAKERS OF FAMOUS LE ROI ENGINES)

## speeds right-of-way maintenance



"Tractair" mobility is ideal for station platform maintenance



"Tractair" makes short work of spike-driving and tie-tamping.

The Le Roi "Tractair" is a self-propelled, pneumatic-tired tractor-compressor that combines all of the features of an efficient, mobile 105 c.f.m. air compressor with the flexibility and utility of a 35 h.p. wheel tractor. All pneumatic tools used in railroad maintenance that can be operated from a 105 ft. compressor can be handled efficiently by the "Tractair." The large pneumatic tires are equally as adaptable to adverse right-of-way conditions

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**LE ROI COMPANY**  
RAILROAD SALES DEPARTMENT  
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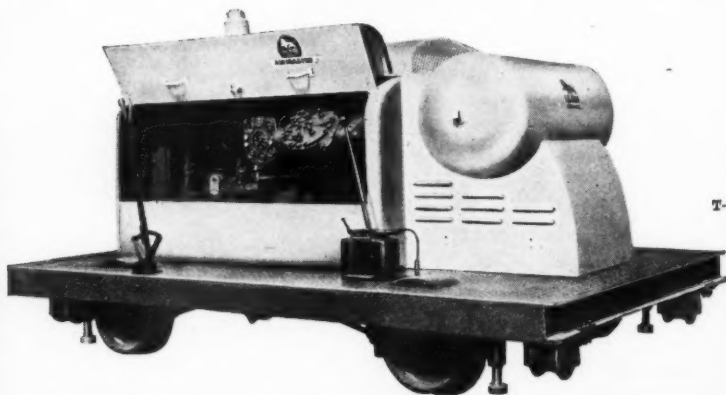
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BRIDGE & BUILDING  
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SEPT. 15-16-17-18, 1947

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ASSOCIATIONS



Le Roi Rail Car Compressor furnished in self-propelled or non-self-propelled models. Sizes: 105, 160, 210 and 315 c.f.m. with gasoline or Diesel power. Chilled wheels, hydraulic jacks, and electric starting are standard equipment

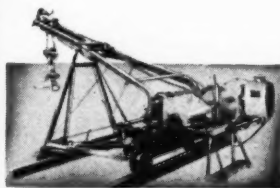
**SAFETY**

Each Meco Lubricator Protects a Number of Curves

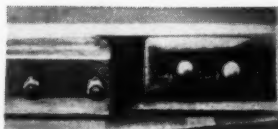
These photos courtesy of—1. Union Pacific—Chicago and North Western Ry. Co. 2. Norfolk and Western R. R. Co. 3. Canadian National Railways. 4. New York, New Haven & Hartford R. R. Co.

# **MECO CURVE-RAIL Lubricators** *Safety with Savings!*

Today's high-speed trains operate with much greater Safety when curves are protected by MECO-Lubrication. This is in addition to MECO'S Long-range Economy; the Two to Four Times Longer Life of Curve Rail, both present and future; and the reduced wheel-flange wear. Installing MECO truly brings Safety with Savings!



A—Power Rail Layer Requires No Train Orders.  
B—Mack Reversible Switch Point Protectors make switch rails last 8 to 10 times longer.



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HOTEL STEVENS, CHICAGO  
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**Maintenance Equipment Company** ★  
RAILWAY EXCHANGE BUILDING • CHICAGO 4, ILLINOIS

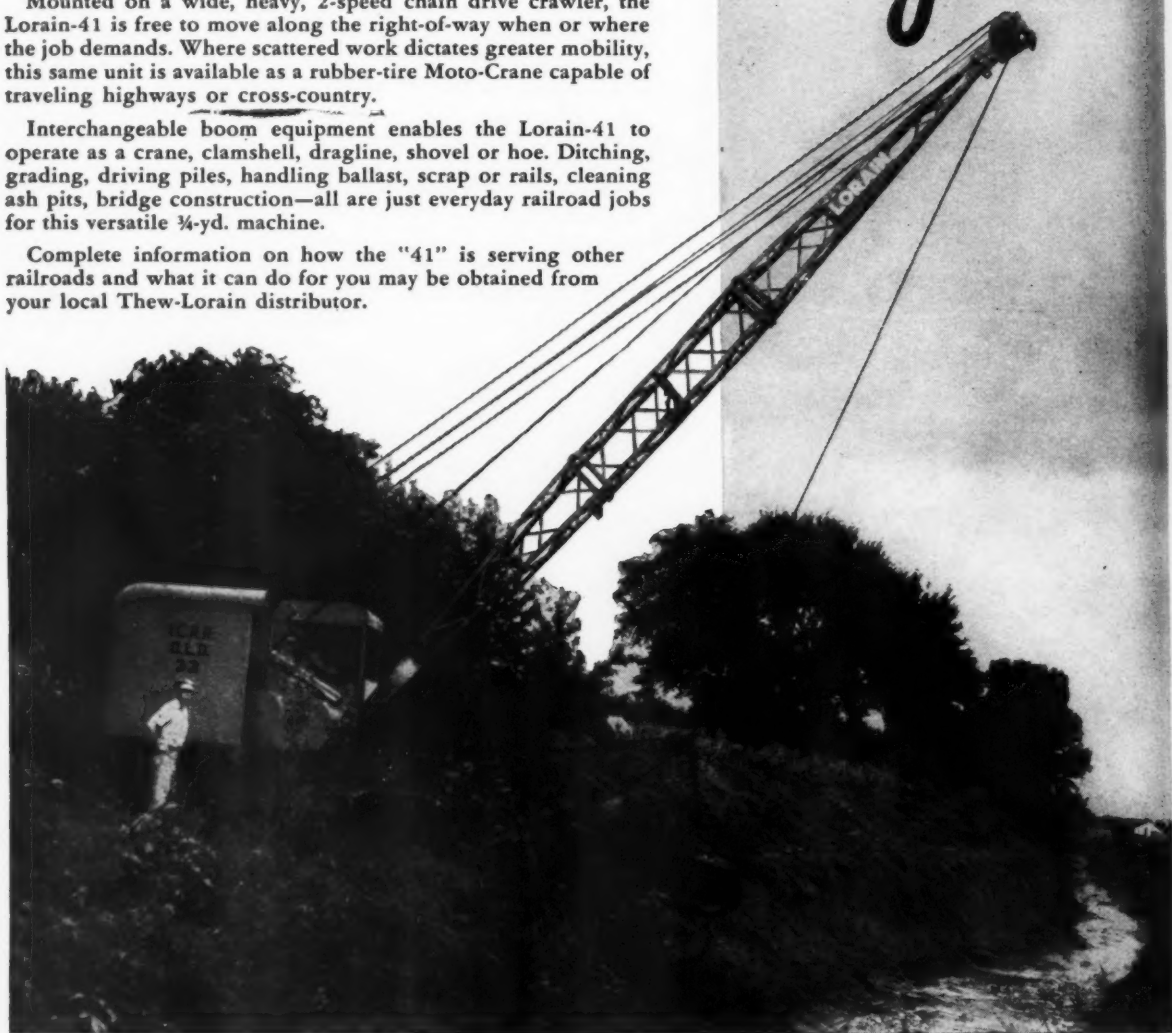
# OFF-THE-TRACK... *and on the job!*

**O**N the job digging a drainage ditch but off-the-track to give paying traffic the right-of-way. The ¾-yd. Lorain-41 offers a happy solution where maintenance work and traffic must both be kept "highballing".

Mounted on a wide, heavy, 2-speed chain drive crawler, the Lorain-41 is free to move along the right-of-way when or where the job demands. Where scattered work dictates greater mobility, this same unit is available as a rubber-tire Moto-Crane capable of traveling highways or cross-country.

Interchangeable boom equipment enables the Lorain-41 to operate as a crane, clamshell, dragline, shovel or hoe. Ditching, grading, driving piles, handling ballast, scrap or rails, cleaning ash pits, bridge construction—all are just everyday railroad jobs for this versatile ¾-yd. machine.

Complete information on how the "41" is serving other railroads and what it can do for you may be obtained from your local Thew-Lorain distributor.



Reg. Trade Mark

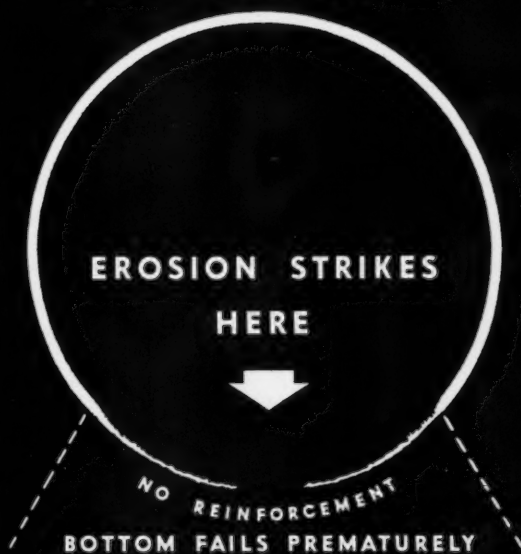
# thew Lorain

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THEW SHOVEL COMPANY  
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**CRANES • SHOVELS • DRAGLINES • MOTO-CRANES**

# HOW TO SAFEGUARD THE "DANGER ZONE" IN YOUR DRAINAGE PIPE

ORDINARY DRAINAGE PIPE



ARMCO PAVED INVERT PIPE



Like the suit that must be discarded because the seat of the pants is worn through, 75% of the average drainage pipe is still serviceable when it is consigned to the scrap pile.

It goes there *because the bottom is worn through.*

This doesn't happen to ARMCO Paved Invert Pipe. A smooth, thick bituminous pavement in the bottom of the pipe protects this danger zone from erosion . . . makes the *bottom last as long as the top.*

Where drainage is severely corrosive, you can specify the added protection of an Asbestos-Bonded

coating for the complete pipe. This coating is immune to corrosive soils, acids, alkalis and gases.

Your culverts last longer, cost less per year of service, and you get full value out of your investment.

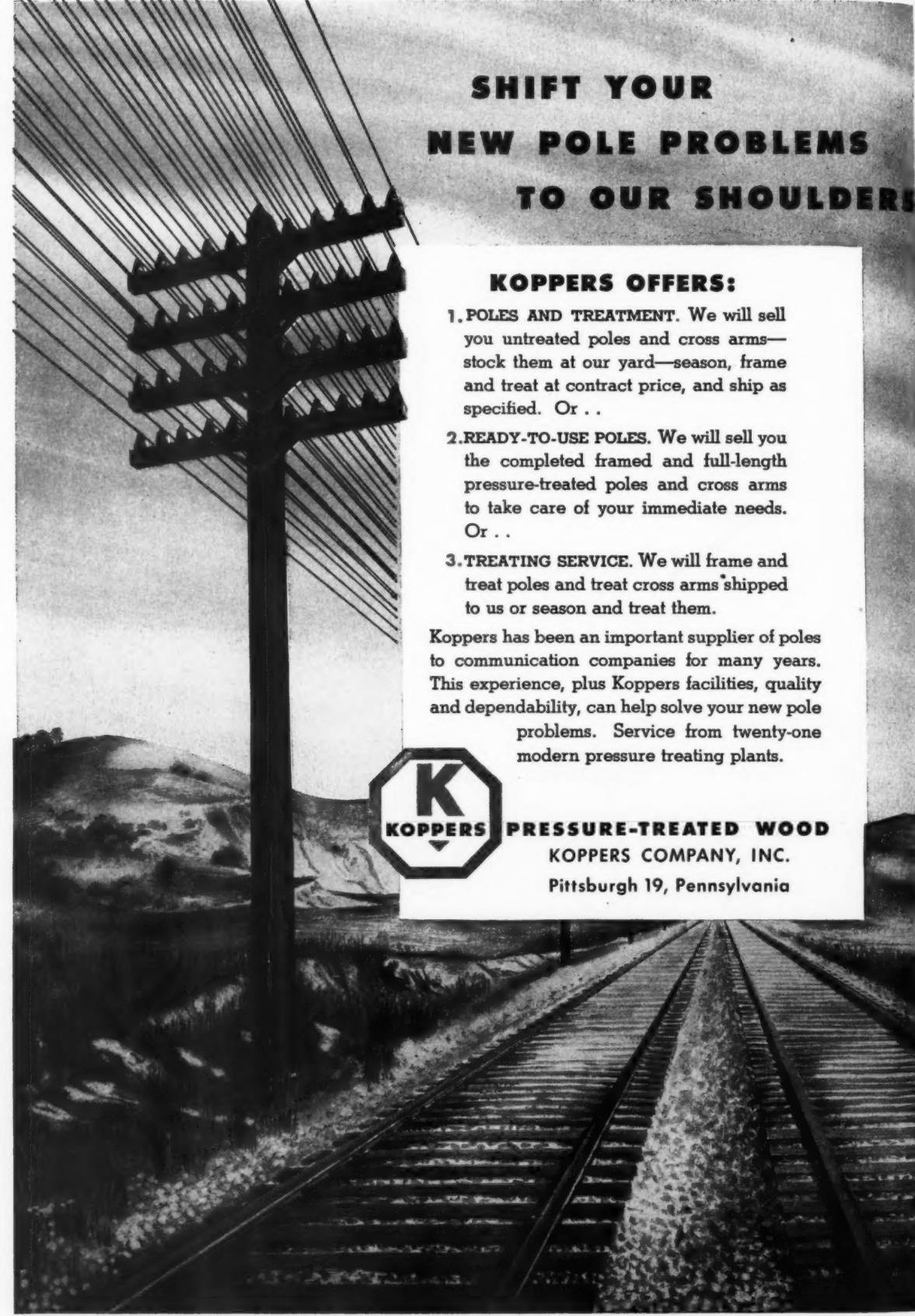
There is an ARMCO Pipe to meet every service condition. For utmost economy choose the one that meets your specific requirements. All ARMCO Pipe has flexible corrugated metal design to assure ample strength under high fills and heavy loads. Write Armco Drainage & Metal Products, Inc., 1795 Curtis Street, Middletown, Ohio.



**ARMCO**  
**CORRUGATED METAL PIPE**



ARMCO Paved Invert Pipe is reinforced on the bottom—the "danger zone" for erosion.



## SHIFT YOUR NEW POLE PROBLEMS TO OUR SHOULDERS

### KOPPERS OFFERS:

1. **POLES AND TREATMENT.** We will sell you untreated poles and cross arms—stock them at our yard—season, frame and treat at contract price, and ship as specified. Or . .
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3. **TREATING SERVICE.** We will frame and treat poles and treat cross arms shipped to us or season and treat them.

Koppers has been an important supplier of poles to communication companies for many years. This experience, plus Koppers facilities, quality and dependability, can help solve your new pole problems. Service from twenty-one modern pressure treating plants.



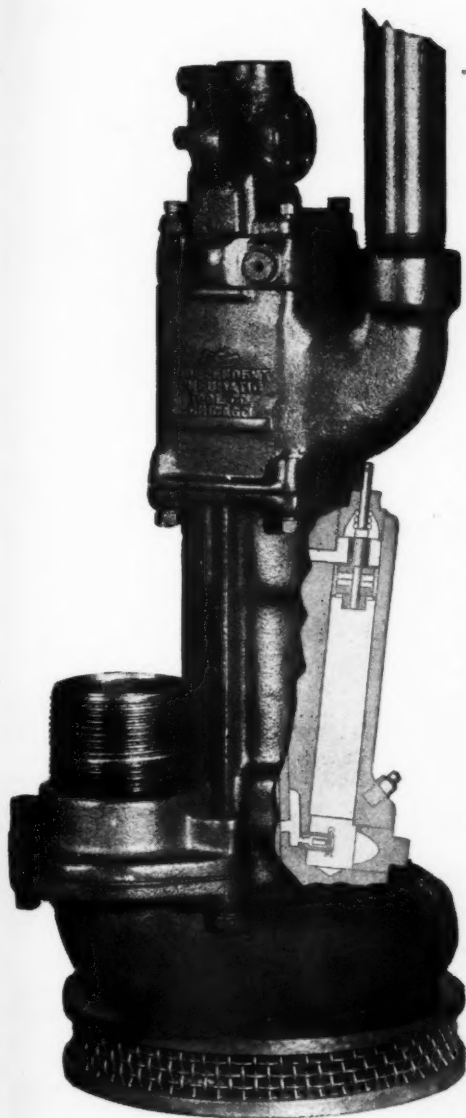
**PRESSURE-TREATED WOOD**

**KOPPERS COMPANY, INC.**

**Pittsburgh 19, Pennsylvania**

# Thor SUMP PUMPS

## Keep Pumping!



### *... Improved Lubrication Assures Peak Efficiency*

In Sump Pumps, the *impeller shaft bearings* are the most vulnerable parts, with premature failure causing undue job delay and expense. Thor safeguards these vital points by a large grease reserve that is force-fed under continuous air pressure—pressure that further prevents foreign matter from working into the bearings. Because of this *exclusive feature*, Thor Pumps can be operated continuously up to a full shift without regreasing.

Thor Sump Pumps are designed to operate efficiently in clean or dirty water; in oil, sludge or sewage—either partially or fully submerged. Your nearby Thor Distributor will gladly demonstrate them as the economical answers to your sump-water problems.

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Year after year the list of Barco users grows. Railroads have bought thousands of Barcos because they know it takes time to prove a tytammer's worth—and they know Barco has a 10-year record of doing more work per shift, winter or summer. Strong, portable, with built-in ignition, the Barco Unit Tytammer is built not too heavy, not too light—but with just the right weight to deliver the right wallop without requiring extra pressure by the operator. For more information write to Barco Manufacturing Company, Not Inc., 1805 Winnemac Avenue, Chicago 40, Illinois. In Canada: The Holden Co., Ltd., Montreal, Canada.

# BARCO

## UNIT TYTAMPERS

FREE ENTERPRISE—THE CORNERSTONE OF AMERICAN PROSPERITY

# 101 RAILROADS

## Use SPERRY RAIL SERVICE Regularly

### To Find ALL Types of Rail Head Defects

**A REAL BONUS IN RAIL SAFETY—  
NOT OBTAINABLE WITH ANY  
OTHER RAIL TESTING METHOD!**

Over 37,000 defective rails containing Longitudinal Defects (Vertical and Horizontal Split Heads) were found by Sperry Detector Cars in 1946 — an average of almost 20 per 100 track miles tested. These were in addition to the more than 45,000 Transverse Defects detected during the same period.

**ONLY SPERRY Induction-Type DETECTOR CARS** are able to indicate Longitudinal Defects in track.

**HIGH TRAIN SPEEDS, GREATER TONNAGE,** demand maximum protection against defective rails provided by Sperry Cars which also find —

**MORE and SMALLER TRANSVERSE DEFECTS** than any other method of rail testing.

*Safety with Sperry*



*for  
Testing Rails in Track*

## SPERRY RAIL SERVICE

Railway Engineering and Maintenance

For additional information, use postcard, pages 829-830



One of more than  
25,000 Vertical Split  
Heads found by  
Sperry during 1946

## WHY LONGITUDINAL DEFECTS ARE IMPORTANT!

### BECAUSE

1. **Serious derailments** have been caused by both types of Longitudinal Defects.
2. **Rapid Growth** of Longitudinal Defects extends along the entire length of the seam from which they develop. Usually more than one such seam is present in the same rail.
3. **Compound Fissures** often develop from Longitudinal Defects — still further increasing the hazard to rail safety.

SP-114

**DIVISION OF SPERRY PRODUCTS, INC.**  
Chicago, Ill., HOBOKEN, N. J., St. Louis, Mo.

September, 1947

845

NON-SHRINK

# EMBECO

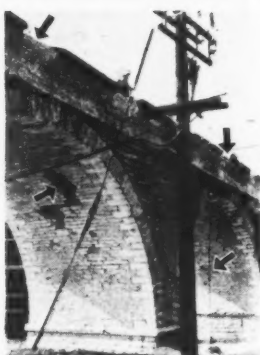
## CHECK CHART

### An Aid To Better Grouting and Reintegration



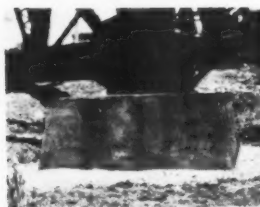
#### ☐ GROUTING BRIDGE SEATS AND TURNTABLES...

By eliminating all shrinkage in grouts, Embeco assures good contact between grout and bed plate and creates a sound bearing surface that stands up through years of service.



#### ☐ REPOINTING OLD STONE STRUCTURES...

Embeco is a specially prepared metallic aggregate, which when mixed with sand and cement produces a non-shrink-ing, perfect bonding, quick-setting mortar of great strength. Because of these characteristics it is ideal for repointing stone structures and similar work. (In bridge at left, parapets and inside of arches repaired with Embeco gunned mortar, stone work tuck-pointed.)



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★ ★ ★ ★ ★



#### ☐ MASTERPLATE IRON-CONCRETE FLOOR...

Masterplate provides an armoured surface pro-duced by incorporating a specially prepared, pure, water-absorbent, graded iron in the *surface* of concrete at time of placing. Masterplate floors wear 4—6 times longer than plain concrete and are sparkproof.

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# the MASTER



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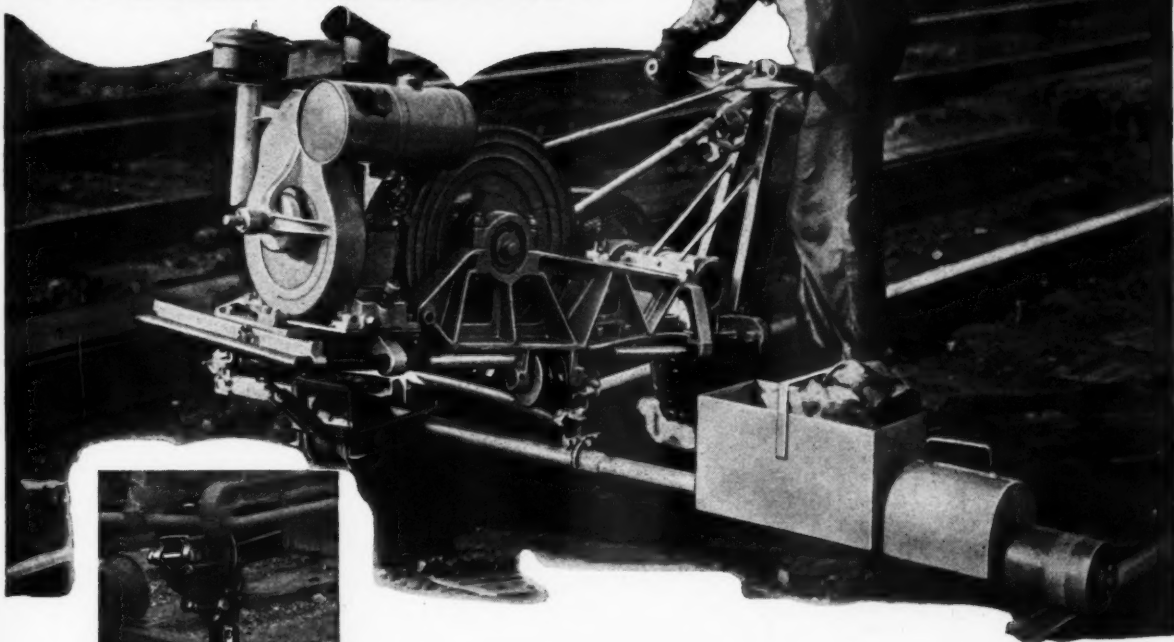
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**UNIFORM TIGHTNESS**

*more Speed-more Power*

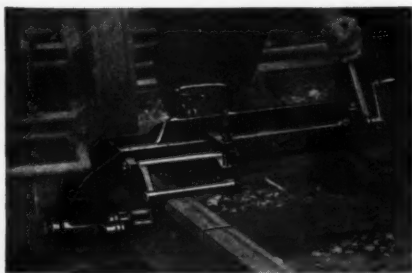
with a **NORDBERG**

**POWER WRENCH**



**DRIVES SCREW SPIKES**

Accessory for driving screw spikes automatically releases when screw is tight.



**DRILLS RAIL**

Wrench becomes a rail drill with this easily attached accessory.

**F**OR removing nuts from old rail and tightening bolts on new rail or for periodic joint maintenance, the Nordberg Power Wrench does the job faster and with greater uniformity of tightness than was ever possible by hand methods. Its ample power will move nuts that are "frozen" or rusted on. Adjustable spring loaded overload release maintains torque within plus or minus 5%.

The Nordberg Power Wrench can also be used for driving screw spikes and drilling rail by the addition of two simple, inexpensive Nordberg developed accessories. For more particulars on this rugged, dependable, versatile wrench, write for Bulletin 125.

**NORDBERG MFG. CO.**  
**MILWAUKEE 7, WISCONSIN**

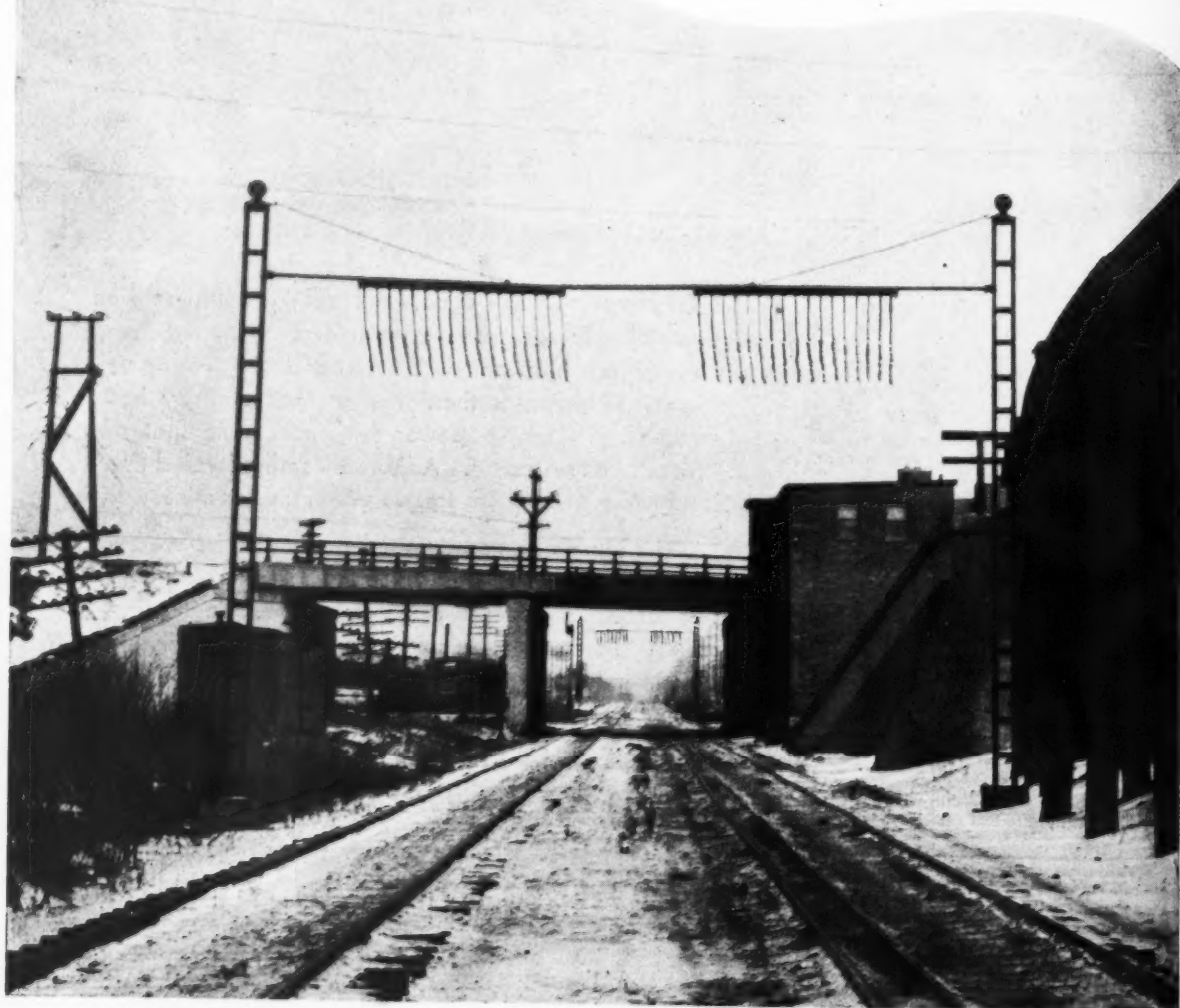
## **NORDBERG TRACK MAINTENANCE MACHINES**

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RAIL DRILL • POWER JACK • CRIBEX • RAIL GRINDER • TRACK SHIFTER

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special layouts furnished on request

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# *Compression Rail Anchors*



**THE RAILS COMPANY**

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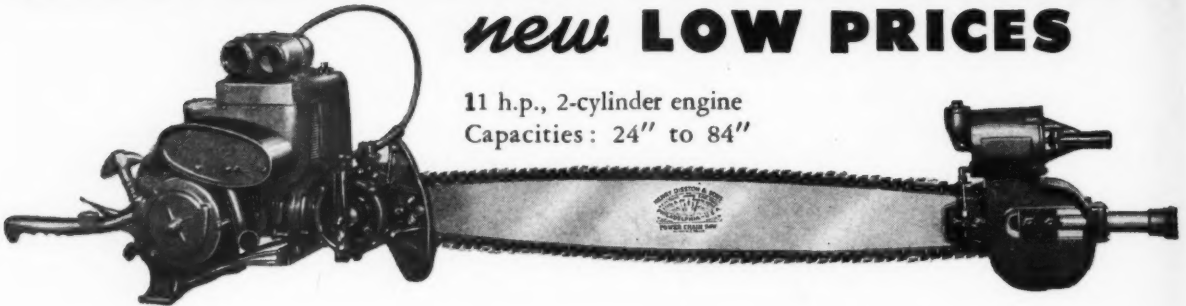
CHICAGO, ILL.

# DISSTON CHAIN SAW

with Mercury Gasoline Engine

*new* **LOW PRICES**

11 h.p., 2-cylinder engine  
Capacities: 24" to 84"



The Disston Chain Saw is the fastest, timber-cutting, portable saw ever made. It is ruggedly built, light in weight, easy to operate, and cuts from all angles. And its numerous exclusive features combine to make it the most dependable, economical and durable chain saw ever made.

Among these features are an 11 h.p., 2-cylinder engine; a positive-acting, non-slip, multiple-disc clutch; a detachable air cleaner which keeps dust from carburetor; die-cast engine cylinders and cooling fan; gear

driven magneto; fuel filter built in tank; a tough, cutting chain of Disston Steel which maintains perfect contact with drive sprocket under all load conditions.

The Disston Chain Saw is a product of Disston saw-making skill and dependability. It's a typical example of the economy of Disston quality. Thousands are now in use on operations of many kinds—in the forests; on railroad contracting, and tree service jobs; at shipyards and manufacturing plants—wherever there are heavy timbers to cut;

## DISSTON CHAIN SAW

### PNEUMATIC



#### HUNDREDS OF APPLICATIONS

A powerful, light weight, air-driven saw that is speeding up timber cutting and reducing costs for general contractors, railroads, shipyards, and many other users. It requires no previous experience to operate, and can be used in all climates and weathers . . . even under water.

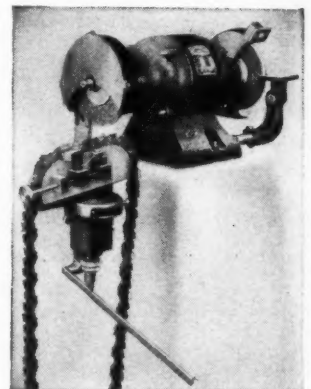
Gear housing and saw mechanism may be rotated in either direction for vertical or horizontal cutting. Equipped with heavy-duty, vane-type motor specially engineered and produced by Chicago Pneumatic Tool Company for use on Disston Chain Saws. Requires little maintenance as it is built for long, economical service.

3½ and 5 h.p. motors in 24" and 36" sizes. The 3½ h.p. motor requires 90 cu. ft. of air per minute, the 5 h.p. motor, 150 cu. ft., each at 90 lbs. pressure per sq. in.



#### NEW FINANCING CREDIT PLAN FOR USERS

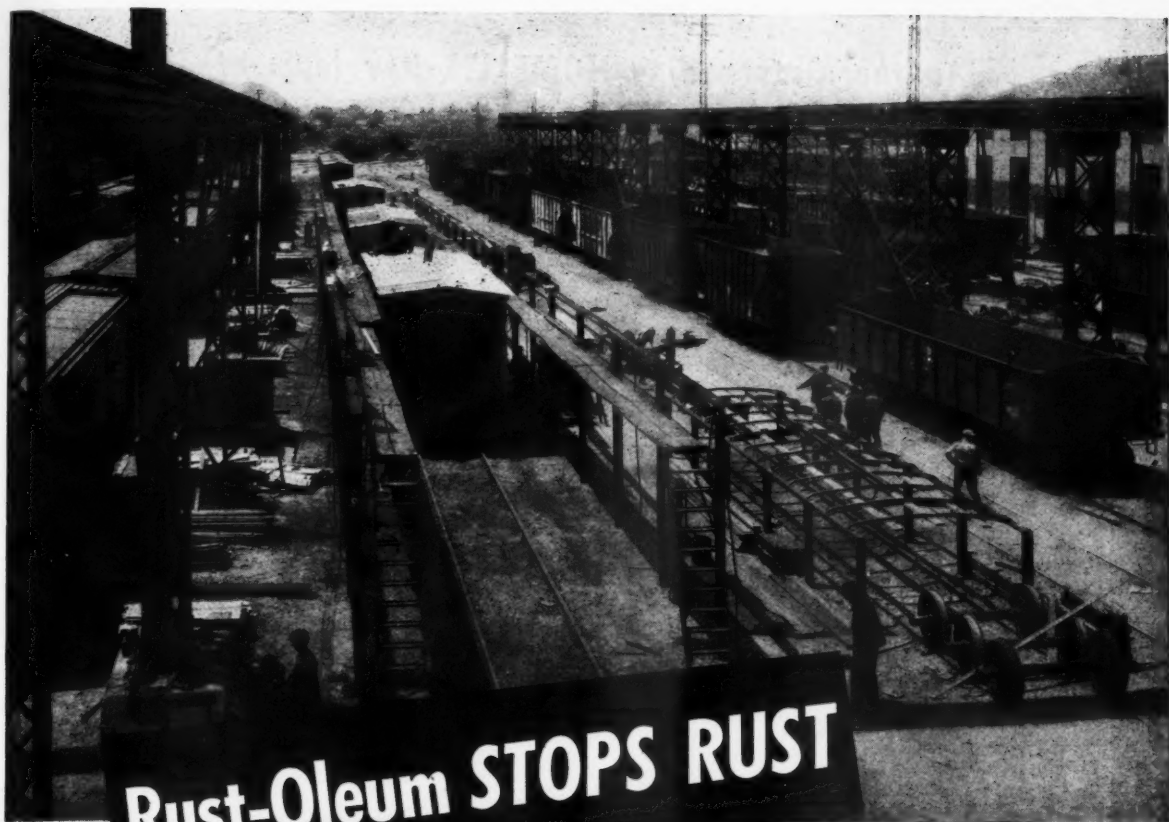
Write for full particulars, or see your Disston Distributor, who carries complete stocks of parts and is prepared to render prompt and expert service.



#### DISSTON ELECTRIC CHAIN SAW SHARPENER

Enables you to do your own sharpening . . . quickly, easily, accurately. Keeps chains in first class condition.

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# Rust-Oleum **STOPS RUST**

**..... IT KEEPS CARS ROLLING LONGER!**

## CHECK THESE 3-WAY SAVINGS

- 1. IT CUTS PREPARATION TIME!**  
No sand blasting or chemical cleaners are necessary. Merely wirebrush to remove paint scale, blisters, etc.
- 2. IT GOES ON FASTER!**  
Rust-Oleum saves 25% of the time ordinarily required for application of ordinary materials... and covers 30% more area.
- 3. IT LASTS LONGER!**  
Rust-Oleum's protective coating outlasts paint two to ten times—according to existing conditions.



**EASY TO USE ...  
LASTING PROTECTION**

**APPLY BY BRUSH,  
DIP OR SPRAY**

Add years of useful life to every car—*new or old*—by safeguarding it with Rust-Oleum. *Rust-Oleum provides lasting, low-cost protection.* It coats metal with a tough, water-tight, enduring film that prevents rust caused by moisture, fumes, acids, heat and other destructive elements found in railroad operation.

As a *proved* rust preventive, Rust-Oleum cuts maintenance cost sharply. Rust-Oleum outlasts ordinary protective materials two to ten times—according to conditions. Specify it on all re-building jobs... and cars will require less frequent overhauls. Rust-Oleum prevents rust on *hidden surfaces* subject to condensation through temperature changes.

*Get the facts now! Write today for Catalog No. 145 for full information and recommended railroad applications.*

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Another Outstanding HOMELITE Development—The New

# *One Man* **ELECTRIC CHAIN SAW**

**FOR BRIDGE BUILDING AND CONSTRUCTION**



## **The Saw That Will Cut Your Costs**

This is it... an amazingly light yet rugged, powerful and efficient chain saw that will save time and cut costs everytime it is used... a *one man* High Cycle Electric Driven Saw that will cut a 12 x 12 timber in 9 seconds flat, and has a capacity up to 3'

With a Carryable Homelite High-Cycle Gasoline-Engine-Driven Generator as its power supply, you can use this 27 lb. chain saw *anywhere*. You can cut piling or heavy timber not only fast but right where construction and repairs are being done. Simple to operate, this saw makes cutting... on all cuts, all positions... much easier. Its unique pivot action takes the strain off the operator. And there are no fumes or engine heat and vibration to cause fatigue. It is simple in design, sturdy in construction... sure to give you greater dependability and lower maintenance costs.

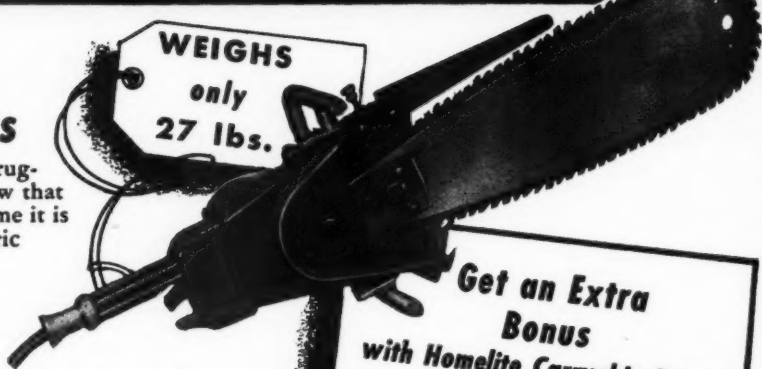
Send for new illustrated bulletin.

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**CARRYABLE PUMPS • GENERATORS • BLOWERS**

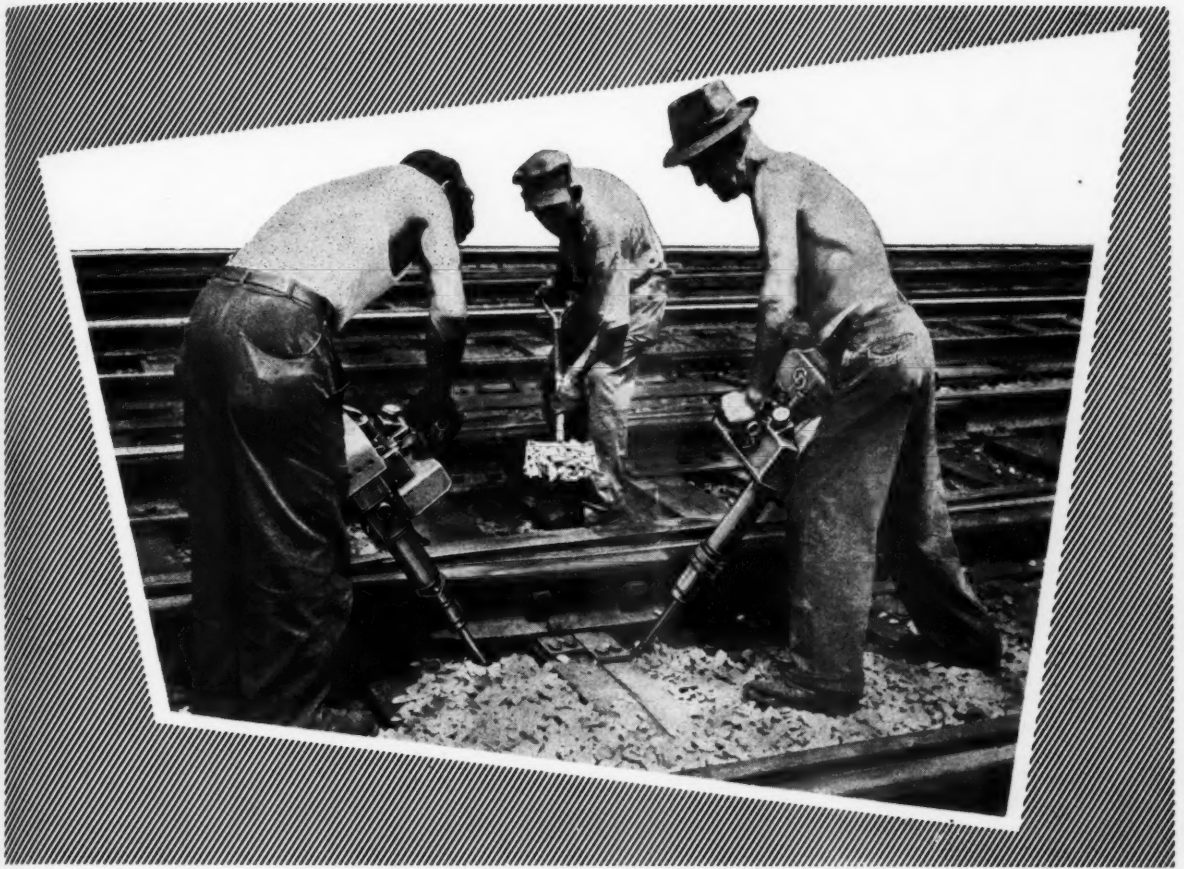
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**WEIGHS  
only  
27 lbs.**



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Bonus  
with Homelite Carryable Power**

Don't forget this *most important point*. The Homelite Carryable Generator that you use to operate your Homelite One Man Chain Saw is an *All-Purpose* Generator. You can use it to operate high-cycle tools such as grinders, nut runners, impact wrenches. You can use it for 110-volt circular power saws, electric drills and many other standard universal power tools. And for night work, you can use it to operate several brilliant floodlights.



## There's a CP tamper for every track job

There is no tie tamper faster or more dependable than the well-known CP-3D Pneumatic Tie Tamper, served by the 60 cubic foot, four-tool CP Patrol Compressor or, for larger jobs, by crawler and flanged-wheel mounted compressors in sizes up to 500 c.f.m.

Where compressed air is not available, there's the easy-to-handle, battery-less CP Gasoline Tie Tamper. Write for bulletin on Maintenance of Way Equipment.

**visit CP exhibits**  
**September 15-18**

Track Supply Association  
and Bridge and Building  
Supply Men's Association  
STEVENS HOTEL, CHICAGO  
BOOTH No. 41

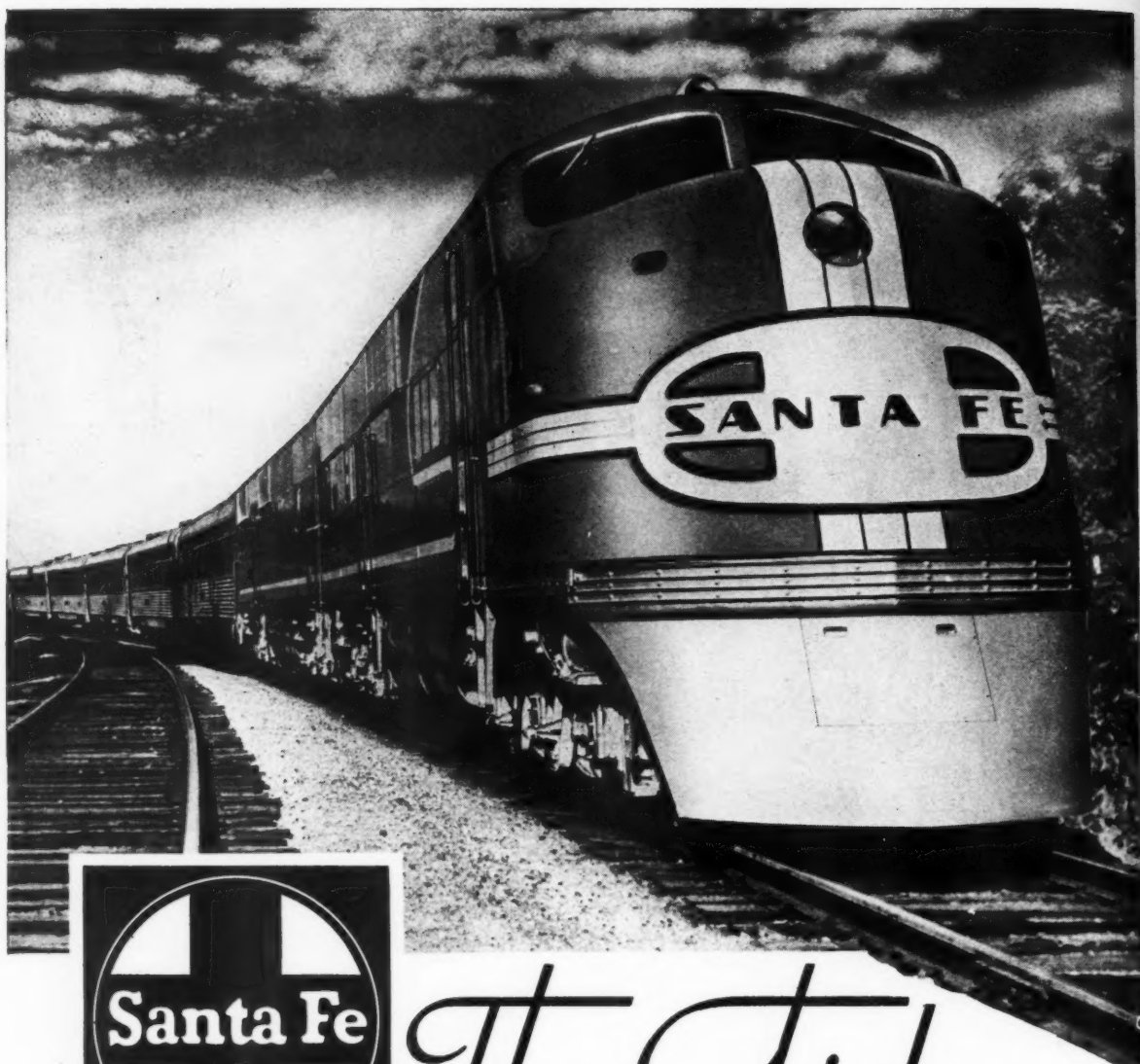
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*The Chiefs...*

## RIDE ON AIR-TAMPED RAILS

Air-operated tie tampers and tools have long played their part in maintaining the superior condition of the Santa Fe roadbed. I-R compressors of both off- and on-track types are stationed along the right of way, where they can quickly supply air power to section gangs for tamping and other maintenance-of-way jobs.

The better the method the better the track—that's the reason for tamping with air—the method introduced by Ingersoll-Rand.

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AIR TOOLS  
COMPRESSORS  
CONDENSERS  
ROCK DRILLS  
TURBO BLOWERS  
CENTRIFUGAL PUMPS  
OIL & GAS ENGINES



## MAGELLAN MIGHT HAVE MADE IT

**I**N 1519, Ferdinand Magellan set sail in five antiquated vessels in an attempt to circle the globe. He died before the voyage was completed although one of the ships did win through after three years of hardship. With power, even in its most elementary form, Magellan might have lived to see the success of his great adventure.

It was nearly three centuries until the successful voyage of "Fulton's Folly" proved that power at sea was practical. Since then, it has made giant strides of progress and in a short half century, Diesel engines have found an ever-growing usefulness.

Today, internal-combustion engines of all kinds are serving the world in its struggle for reconstruction.

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### SERVING POWER

American Bosch serves the internal-combustion-engine industry in three vital ways:

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**PRODUCTION.** Premium performance has been a consistent goal in the production of hundreds of thousands of Diesel injection systems and millions of electrical units.

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DIESEL FUEL INJECTION • AUTOMOTIVE AND AVIATION ELECTRICAL PRODUCTS

No. 225 of a Series

# Railway Engineering and Maintenance

SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.  
CHICAGO 3, ILL.

Subject: The Exhibit This Month

September 1, 1947

Dear Readers:

In the August issue I reminded you of the coming annual conventions of the Roadmasters' and Bridge & Building associations to be held in Chicago, September 16-18, and stressed the value of these two important meetings. Intimate association with the development of the strong programs that have been set up for both of these meetings, as detailed elsewhere in this issue, prompts me to bring this matter to your attention again. In doing so, however, I want this time to emphasize the value of the accompanying joint exhibit of the Track Supply Association and the Bridge & Building Supply Men's Association and, frankly, lay on you some responsibility to make this exhibit of greatest value to yourselves, your railroads, and to the companies that will display their products.

Many of you have attended exhibits of these two associations in the past and know of their value, but most of you may not realize how they have grown in size and scope over the years, and that this year, in the joint exhibit of the two associations, you will have one of the best opportunities ever presented in conjunction with the fall conventions to see the latest in materials, equipment and appliances, developed and improved to assist you in your work.

As pointed out in later pages in this issue, more than 90 companies will present exhibits—some for the first time. Here, in the same hotel, convenient to the meeting rooms of the two railway associations—with several hundred railway supply company representatives to assist you—you may find the answer to your needs or the solution to some of your problems. Certainly, you will gain valuable ideas and a "lift" from seeing the progress that has been made in equipment and materials designed to help you in your various operations.

As to your responsibility in connection with the exhibit, each of you has a responsibility to yourself and to your road to gain to the fullest the advantages inherent in the exhibit. But you, and especially the roads you represent, also have a responsibility to the manufacturers who will go to such effort and expense to assemble their products at a central point for your convenience in seeing them. While this may prove a secondary consideration with you, it should not be overlooked that, largely for your benefit and that of the railways generally, the manufacturers that will be represented in the exhibit will spend a huge amount of money to put on their displays. To the extent that you and other railway men do not avail yourselves of the exhibit, this expenditure will have been in vain.

Of course, it will be impossible for all of you to attend the conventions and exhibit. For those of you who can't, I assure you again that in the editorial pages of your October and November issues of Railway Engineering and Maintenance you will receive a comprehensive report of both meetings and, in the advertising pages, a veritable Exhibit-in-Print. Even if you attend the meetings in September, your October and November issues will give you a valuable record of the proceedings and of the products on display at the exhibit—and you can be sure that we will do everything to make these issues better than ever before.

Sincerely,

*Neal D. Howard*

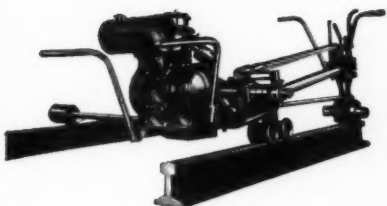
Editor

NDH/cd

# RACO POWER TRACK MACHINES

*Efficient—Time—Labor Saving*

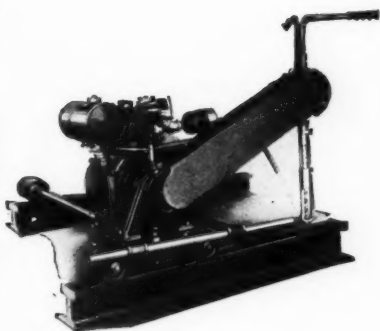
**One-Man Units for Tightening Bolts, Boring Ties and Drilling Rails**



## TRACK WRENCH

Great Power, Speed, Flexibility, Facility and Smoothness of Operation. Accurate automatic torque control. Quick switch from high to low gear. Full power lever for doing the impossible in removing rusted nuts.

Operating head has floating balance. All moving parts housed, except chucks.

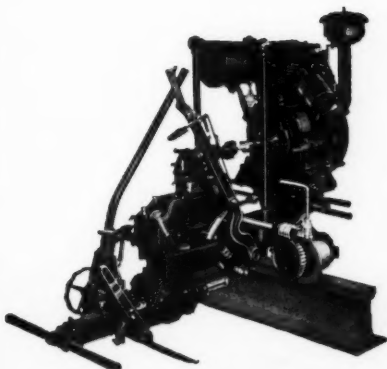


## TIE BORER

Boring holes for cut spikes during rail laying gives so much better line of track that much of usual re-aligning is eliminated.

Boring proceeds as fast as spike driving.

Spike setting requires half as many men.



## M-W DRILL

Facility of operation is the factor that determines the value of a track drill.

The Everett is complete with every necessary adjustment for rapid and accurate drilling.

The Everett can be clamped over splice bars, or to rail without bars. It will drill rail through splice bar holes. It can be used for drilling nearly all holes in switch layouts where minimum clearance is obtained.

**RAILROAD ACCESSORIES CORPORATION**

• CHRYSLER BUILDING • NEW YORK 17, N.Y. •

*Men and Machines* MAKE PERFORMANCE ON THE JOB COUNT



*Skilled in the manipulation of the rod, flame and arc, the Welder is a master craftsman who wields the tools of his trade to perform an alchemy in metals.*

**OUT** on the line comes the call for the welder. Metal must be fused with metal. Each weld must be a united bond of strength. Both passenger and freight depend on the skill of these hooded men with the sputtering arc.

From roundhouse and repairshop to the far-flung ends of the road, countless welding jobs are the order of the day. Wherever welding equipment must be carried in safety and with dispatch, there you will find the Fairmont M14 Series H to help fulfill the requirements of the road.

FAIRMONT RAILWAY MOTORS, INCORPORATED

Fairmont, Minnesota

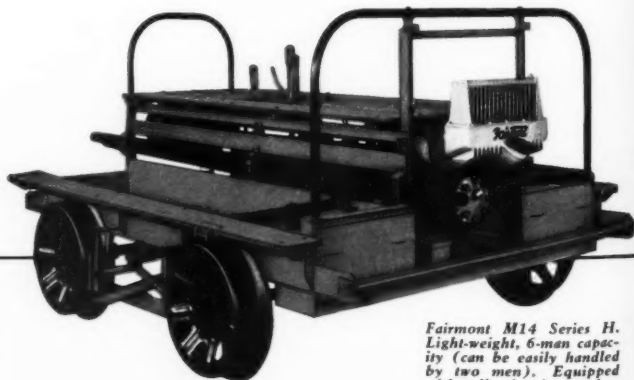
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**RAILWAY MOTOR CARS**

*Performance*  
ON THE JOB  
COUNTS

**OF ALL THE CARS IN SERVICE TODAY  
MORE THAN HALF ARE FAIRMONT'S**

*Fairmont Motor Cars*  
*Efficient and Safe Job Handling*



*Fairmont M14 Series H. Light-weight, 6-man capacity (can be easily handled by two men). Equipped with roller bearing engine.*

# Railway Engineering and Maintenance

NAME REGISTERED U. S. PATENT OFFICE

SEPTEMBER, 1947

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Railway Costs—Meetings	
<b>Burlington Battles Record Floods on Many Lines</b> - - - - -	<b>863</b>
Tells how this road suffered heavy damage from recurring washouts, inundation and slides after the severe storms that occurred in June	
<b>Broken Switch Point Derails Passenger Train</b> - - - - -	<b>867</b>
A brief abstract of the Interstate Commerce Commission's report of its investigation of an occurrence on the Southern Pacific near Guasti, Cal.	
<b>Applying Radiant Heating to a Passenger Station</b> - - - - -	<b>868</b>
Paul S. Park outlines the design procedure to be observed when this new development is selected for a typical railway structure	
<b>Roadbed Grouting Outfit Has Novel Features</b> - - - - -	<b>871</b>
Describes the simple but effective assembly of equipment developed for use on the Denver & Rio Grande Western	
<b>Keeping a Motor Car Running</b> - - - - -	<b>873</b>
In No. 15 of a series, G. R. Westcott discusses shop and field maintenance and suggests an effective organization for this important work	
<b>Roadmasters and B &amp; B Men All Set for Concurrent Meetings</b> - - -	<b>876</b>
The complete program for the Associations' annual conventions at the Hotel Stevens, Chicago, September 16-18	
<b>Suppliers Plan Record Exhibit</b> - - - - -	<b>878</b>
Contains a complete list of companies participating in the joint display of the Track Supply Association and the B & B Supply Men's Association	
<b>What's the Answer?</b> - - - - -	<b>881</b>
Retaining Men with Machines	Replacing Broken Rails
Cold-Riveted Structures	Paintability of Various Woods
Upholstered Furniture	Having Garages Repair Trucks
Mechanical Tamping Methods	Power Pipe-Threading Machines
<b>New Devices</b> - - - - -	<b>888</b>
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NEAL D. HOWARD

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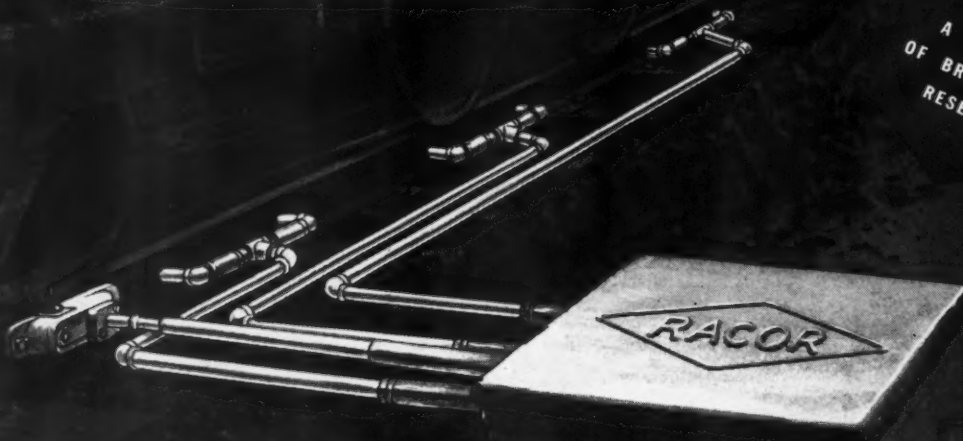
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*Announcing* **RACOR'S**  
**improved model 4000**  
**RAIL LUBRICATOR**



A PRODUCT  
OF BRAKE SHOE  
RESEARCH

RACOR  
MODEL 4000  
RAIL LUBRICATOR

**... that minimizes destructive friction  
and abrasion and abusive track stresses**

Positive feed of lubricant developed by each passing wheel assures ample and extensive distribution by wheel flanges. Rail life is materially extended — track maintenance substantially reduced. Safer, higher speeds and increased tonnage ratings result when RACOR'S IMPROVED RAIL LUBRICATORS are installed.

Write for circular containing complete description and illustrations of improvements on RACOR'S RAIL LUBRICATOR.

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BRIDGE & BUILDING  
TRACK SUPPLY

HOTEL STEVENS, CHICAGO  
SEPT. 13-16-17-18, 1947



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DEPTH HARDENED CROSSINGS    SAMSON SWITCH POINTS    MANGANESE STEEL GUARD RAILS  
AUTOMATIC SWITCH STANDS    VERTICAL SWITCH RODS    REVERSIBLE MANGANESE STEEL CROSSINGS  
**World's most complete line of Track Specialties**

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# Railway Engineering and Maintenance

## Railway Costs—

### Roads Must Balance Outgo With Adequate Income

The railroads of the United States are confronted with a serious economic problem. In spite of the fact that their freight traffic is at a record peace-time level, high labor and material costs, high taxes, special demands being made on them, and inadequate rates for the services they render, are restricting their net earnings to the point where the roads cannot attract the necessary capital to make many desired or essential improvements, and can barely carry forward adequate programs of roadway and equipment maintenance. This situation exists in the face of the fact that if the roads are ever to earn an adequate return, it should be now — now when they have the traffic volume; now that they might overcome the deferred maintenance of their fixed properties and equipment that accumulated during the war years; now that they might maintain and strengthen their properties commensurate with the booming economy and needs of the country; and now, in order to prepare for the "rainy day" that history has taught is inevitable after periods of prosperity.

The railways are almost the only large industry in the country which is not now making record profits. In the first half of 1947 they handled about 50 per cent more traffic than in the first half of 1929, previously considered a boom peace-time year, but made 35 per cent less net operating income. What is the matter? The answer to this question should be understood and weighed carefully by employees, shippers and the public generally — for all have an important stake in healthy, progressive railroads, and the railroads can be neither healthy nor progressive if present low net operating income is to continue to prevail.

Basically, the answer is to be found in existing freight rates that are not commensurate with the high taxes assessed on the railroads, the high wages and other concessions being allowed or demanded by employees, and the high prices being asked for most everything they buy. Let us consider each of these briefly.

To be sure, federal income taxes are lower than they were during the recent war years of high traffic volume and earnings, but, nevertheless, all taxes in 1946, reported as \$498,573,630, were \$142,896,073 more than the \$355,677,557 in 1939, and during the first six months of the current year had already exceeded \$451,570,000.

And what has been the effect of wage increases? In April 1946, wage increases of about 17 per cent were awarded to all railway employees retroactive to January 1, 1946. As of May 22 also, all employees received an additional 2½ cents an hour, bringing the total increase to nearly 20 per cent — at an estimated increase in costs to the railroads in wages of approximately \$655,000,000 annually, exclusive of payroll taxes.

Not to be overlooked too in their effect on the net income of the railways, are the added costs to them for the increased benefits afforded employees through the Crosser amendment to the Railroad Retirement Act. These benefits, which became effective January 1, and July 1, 1947, respectively, increase the payroll tax of the railroads 6½ to 8¾ per cent — an increase which is estimated to cost the railroads approximately \$90,000,000 annually on the basis of present employment.

Increased material prices are also giving a body blow to the roads in the face of the price they are allowed to charge for their services. According to statistics compiled by the Bureau of Labor Statistics of the United States Department of Labor, wholesale commodity prices in April, 1947, the last month for which complete statistics are available, were up 47.7 per cent over 1926 prices and as much as 96.9 per cent over 1939 prices; and there is no relief in sight.



And now comes the recent signal order of the Interstate Commerce Commission which, in brief, requires the railroads to install block signaling on all lines not now so equipped on which freight trains are operated at 50 m.p.h. or more, or passenger trains at 60 m.p.h. or more, and to install train stop, train control or cab signaling where any trains are operated at 80 m.p.h. or more. Such installations, it is estimated, could cost the railroads in excess of \$150,000,000.

#### Effect of New Demands by Employees

And what about the additional demands currently being made by employees? As these comments are being written, hearings are being held before an arbitration board on the request of non-operating employees for an increase of 20 cents an hour, which, if granted in full, together with the resulting increase in payroll taxes, will, according to the carriers, amount to \$566,000,000 annually. And at the same time the operating groups are currently negotiating with the carriers for 44 rules changes, which, if allowed in full, would, it is estimated, cost the railroads an additional one billion dollars a year.

How can the railroads meet such increased costs? Obviously, the answer lies primarily in the rates they can charge for their services. In view of this, early in 1946, the carriers petitioned the Interstate Commerce Commission for an average freight rate increase of 25 per cent. Effective January 1, 1947, they were allowed an average increase of 17.6 per cent. That this was far from adequate — estimated to result in an increased earnings of \$980,000,000 — was immediately emphasized by the railroads, and time has proved them only too correct — so much so that they are now petitioning the commission for a further average advance in freight rates of about 16 per cent.

#### Present Rates Are Not High

That present rates, compared with commodity prices, are not high, is seen in statistics compiled by the I.C.C., and those of the Bureau of Labor Statistics referred to previously, which show that while average revenue per ton-mile is now slightly lower than in 1926, the wholesale prices of all of the larger groups of commodities used by the railroads, including fuel, metal and iron products, and building materials, range from 3.4 per cent to 76 per cent higher, and average about 48 per cent higher. Even the general advance in freight rates of about 16 per cent being sought by the railways would make average revenue per ton-mile only about 15½ per cent higher than in 1926, and about 34 per cent higher than in 1939.

Fortunately, many leaders in industry that have

secured big increases in the prices of their commodities have enough fairness, intelligence and foresight to back up the railroads in the modest increase they are asking for their services. Others will support the increase sought by the roads if only to assure a sound railroad transportation system, essential to their businesses. But there will be plenty of short-sighted opposition. Especially in view of this, all railroad employees should stand behind their industry's request — in the interest of the public, all shippers, and their own welfare — because it is becoming increasingly evident that all of them will suffer if the railroads soon cannot balance outgo with adequate income.

## Meetings—

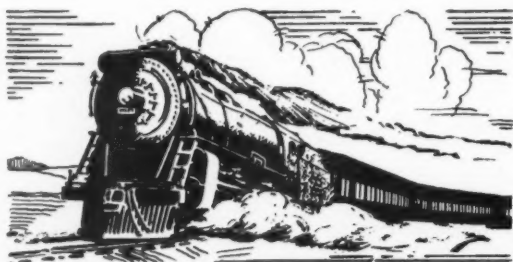
### How to Keep Up with the Times

A GREAT deal can be said about the value of attending conventions and of getting the most out of them while in attendance, but in the final analysis it can all be boiled down to the one thought—"keeping out of a rut." Of necessity railroad maintenance men are confined in their daily labors to a single railroad, and usually to a relatively limited territory of that road, so that they have little or no opportunity to find out how similar work is done on other lines or possibly even on distant portions of their own lines. Under such circumstances it is easy, possibly without even being aware of what is happening, to fall into a rut where the horizons of thought are severely restricted.

This is a development that must be avoided if one is to be of the greatest possible value to himself and the company he works for. There are many ways of keeping out of a rut, but none of them are more effective than exchanging ideas with those engaged in similar work on other roads. For railroad maintenance men such opportunities normally come only once or twice a year, and to fail to take advantage of them in these days of rapidly changing practices, standards and equipment is equivalent to quitting school before the course of study has been completed.

One of these opportunities is to be presented almost immediately in the form of the concurrent conventions of the Roadmasters' Association and the American Railway Bridge and Building Association at Chicago on September 16-18. With the programs packed with addresses and committee reports on timely subjects, and, withal, allowing ample time for the discussion of moot points, both during and outside the regular sessions—and not forgetting the record exhibit of manufacturers' products that will be held coincident with the meetings—individual maintenance men will want to pull themselves up sharply if they have been wavering in their determination to be there.

There is one further consideration involved in utilizing association meetings as a means of keeping abreast of the times. This is the desirability, when in attendance at a meeting, of making the most of the event by not overlooking any opportunity to learn something new, whether it is learned in the meeting room, in the hotel corridors, or in the exhibit hall.



# Burlington Battles Record Floods

The series of unprecedented floods which occurred over wide areas in Nebraska, Iowa and Missouri during June, causing extensive damage to railway property, were particularly damaging to the lines of the Chicago, Burlington & Quincy. This article recounts, in part, the nature and extent of the damage at many locations on the Burlington and tells of the means employed to make repairs and to restore the affected lines to service.

## on Many Lines

THE unprecedented and re-occurring floods that swept over a large area in the Middle West during June of this year, caused heavy property damage to the railroads in Nebraska, Iowa, Missouri, and parts of Illinois, and especially to that of the Chicago, Burlington & Quincy, which has a network of main, secondary and branch lines within this area. These routes include the main line of the road from Chicago to Denver, and important lines between Galesburg, Ill., and Kansas City, Mo.; between St. Louis, Mo., and Burlington, Iowa; between Kansas City and Omaha, Neb.; and between Lincoln, Neb., and Billings, Mont. Every one of these lines was out of service at one time or another, the Chicago-Denver main line being closed to traffic nearly three weeks, while shorter interruptions occurred on other routes. Branch lines also suffered heavily, particularly in Iowa, where all of the company's branch lines were out of service at one time or another.

During the period of floods which covered practically the entire month, the Burlington experienced virtually every type of water damage, including inundation, cut and embankment slides, damaged and washed-out bridges, and numerous track wash-outs, some being several thousand feet in length. Flash floods of unusual force occurred at some points, completely demolishing the track and roadbed wherever they struck.

### Floods Throughout the Month

The flood conditions began on June 4, when heavy local storms sent a number of small streams in Iowa and eastern Nebraska into flood stages, causing small washouts at many points

The Force of the Flood Waters at Curtis, Neb., Carried the Main Track and Three Yard Tracks off the Roadbed, and Twisted Them Together, as Shown in this View





Using Caterpillar Tractors to Pull a Stretch of Damaged Track Back onto the Roadbed

on the Burlington lines in this section. These waters had hardly subsided when heavy rains occurred over a wide area to cause second floods in some of the smaller streams and new floods in others. This storm, which occurred June 6 and 7, also caused high water in a number of the larger streams in the area, notably the Des Moines, Cedar, and Iowa rivers in Iowa, and the upper Mississippi river. At the same time, other streams, discharging into the Missouri river, sent this river out of its banks at many points. These flood conditions caused extensive damage to the Burlington's lines over a much wider area than had previously been involved, particularly in the vicinity of Hannibal, Mo., Quincy, Ill., Ottumwa, Iowa, and other points along the swollen streams.

Again the flood waters subsided only to rise again after another heavy rain which fell throughout the entire area on June 13 and 14. This caused new flood damage at many points already affected and caused the already-swollen upper Mississippi to attain new high levels at many locations. Finally, starting on June 21, a severe storm caused flash floods in many streams in Nebraska, which struck the Burlington at several points in that state, notably at Cambridge, Ravenna and Curtis, with severe damage to the company's property at each location.

### Many Lines Damaged

During the period covered by these various storms, virtually every main traffic route on the Burlington system was out of service at one time or another for periods ranging from a day to more than four weeks, some routes being out of service two or more times. Through trains were, in most cases, detoured but a number of through and local trains were annulled. Detour routes were set up as

they became necessary, on branches or on other roads, but these arrangements were subject to frequent change as interruptions to service occurred on the detour routes.

### Continuous Restoration

Because of the recurrent nature of the floods it was necessary to carry on restoration work almost continuously, with men and equipment being shifted from place to place to cope with the changing situation. Several thousand cars of filling material and rip rap were used to restore the damaged lines to service, being brought to the scene of trouble over the most convenient open route.

When the extent of the rains and the amount of rainfall became known, Burlington maintenance and transportation officers were able to dispatch men, equipment and material to known danger points before washouts actually occurred. In other instances the local forces, augmented by hastily-recruited workers from the immediate vicinity, were able to prevent threatened damage by the use of sand bags and other protective measures.

The first flood conditions developed on the Burlington on June 4, when many small washouts occurred on the main line between Ottumwa and Omaha, and on a freight by-pass around Omaha. These lines were out of service for as much as 36 hrs. while the washouts were being repaired by the local forces. On June 6 new rains throughout Iowa and parts of Missouri caused washouts at many of the locations that were repaired only a day or so before. These floods also washed out the line at points not hitherto affected, particularly in and immediately west of Ottumwa where the Des Moines river parallels the track for about four miles. This line, which is double track, was almost completely destroyed throughout this

distance by washouts 6 to 10 ft. deep, and up to 2,200 ft. in length.

Anticipating that severe damage would occur, maintenance officers ordered extra-gang forces, equipment and filling material, to this point before the washouts occurred. These forces were able to make speedy repairs and one track was restored to service on June 10.

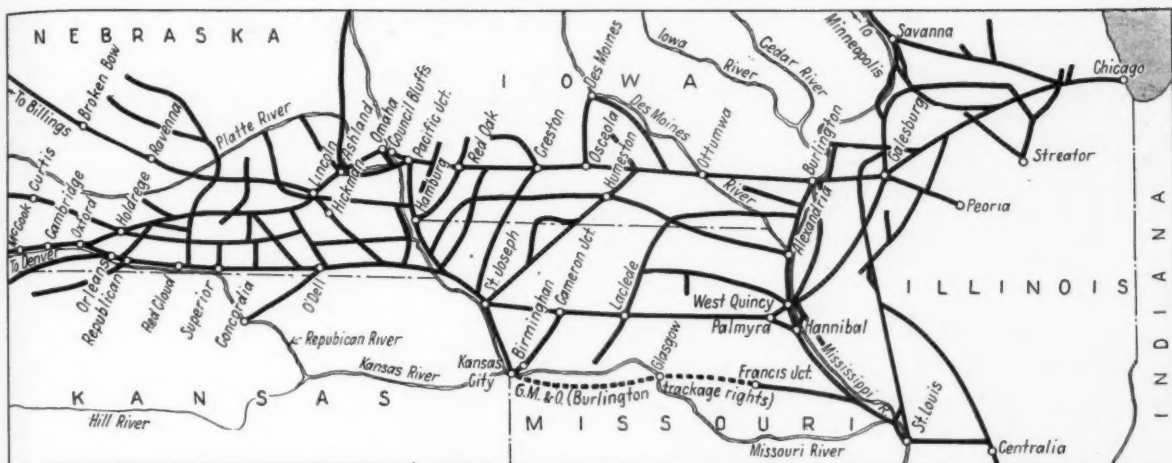
At the same time, service on the Chicago-Kansas City line was interrupted by high water at several points between West Quincy, Mo., and Palmyra, due largely to a break in a levee along the Fabius river. Here, after rising more than 10 ft. over the track, the water subsided slowly, thereby delaying the restoration work. Other washouts developed on this line just west of Laclede, Mo., and at several points between Cameron Junction, Mo., and Birmingham.

The high water in the vicinity of West Quincy also affected the line from St. Louis to Burlington, and this route was also blocked at Hannibal, where the Mississippi river reached an all-time high.

### New Rains

After two days of clear weather, another general storm developed near Omaha on June 12, and moved eastward across Iowa. This resulted in washouts on the by-pass route around Omaha, already mentioned, and caused other floods at many points in Iowa, some for the second or third time. The heaviest main-line damage occurred at Ottumwa where, as already pointed out, the main line of the Burlington parallels the Des Moines river for about four miles. This time the flood waters rose above the track, being 12 in. deep in the station at Ottumwa, and remained at high levels for several days. All of the restoration work that had been done the previous week was destroyed and the line had to be rebuilt a second time. Also, numerous small washouts and many slides occurred between Ottumwa and Pacific Junction, Iowa.

Most of this damage was in the immediate vicinity of Ottumwa and hundreds of cars of filling material, principally sand, from points as far removed as Louisville, Neb., were required in rebuilding the roadbed, Nordberg power jacks being used to raise the track to grade. To provide man-power for the work the regular section forces at Ottumwa were augmented by 150 extra-gang laborers brought from other points on the sys-



Map Showing the Burlington's Lines in the Areas Affected by the Floods

tem, and by a large number of high school boys recruited locally, the latter being used primarily in removing the silt and debris which covered the company's property in this area. The track was finally opened between Ottumwa and Creston on June 26, after being out of service for 12 days.

#### Major Bridge Washout

The most serious traffic interruption occurred on the main line just west of Red Oak, Iowa, where the line crosses the East Nishnabotna river. The bridge at this point is a double-track deck-girder structure embodying two 100-ft. spans with flanking 85-ft. spans, all supported on concrete piers and abutments. Normally the clear height of this bridge above the stream is 30 ft. Following heavy rains on July 13, and an unusually high stage in the river, the east abutment settled approximately 14 in., causing the superstructure of the east span to be thrown about a foot out of line to the north. Also deep scouring had occurred around the east pier. An embankment comprising the east approach to the structure was entirely washed out for 56 ft.

Steps were taken immediately to save the threatened pier by placing rock around its base to reduce the force of the current and eliminate the scouring action, about 30 carloads of material being used for this purpose. At the same time, about 100 carloads of rock were unloaded around the east abutment to prevent further settlement which might have caused the loss of the superstructure. This material was handled by hand and by

clamshell, with bulldozers being used to work the material around the abutment.

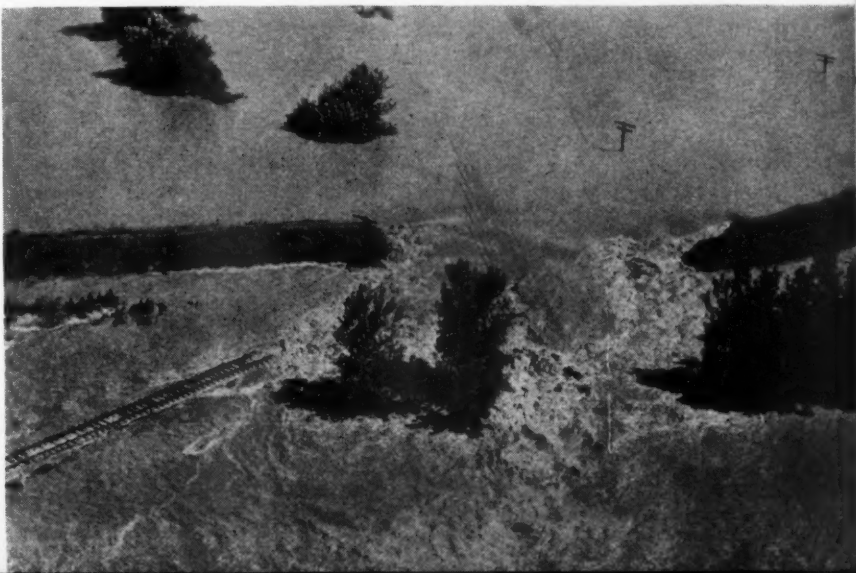
While this preventive work was being done, a pile trestle was constructed across the gap in the east approach, after which a temporary pier of steel H-piling was driven immediately west of the damaged east abutment to support the girders. A timber pile pier was then driven just east of the abutment, and I-beams, hastily brought from a bridge construction project, were laid on the temporary piers to span the abutment. These beams were laced into the floor system of the girder span, thus supporting it as well as carrying the track over the abutment. Because of the difficulty in reaching the site with material and equipment, the work was delayed considerably, with the result that the bridge was out of service for 19 days, single-track service being restored over it on July 2.

The rains that preceded this flood saturated embankments and cut slopes and caused numerous slides, particu-

larly on the main line between Osceola, Iowa, and Pacific Junction. At some of the slides involving embankments as many as 135 cars of filling material were required to restore the roadbed to satisfactory condition. Other trouble occurred near Council Bluffs, Iowa, when a levee, along a stream known as Mosquito creek, gave way, causing the main track to be washed out to such an extent that two days were required to make repairs. Moreover, every branch line of the Burlington in Iowa, and numerous other branches, were put out of service as a result of the heavy rains that occurred on or about July 13.

Meanwhile, service was halted on the important line paralleling the Missouri river between Kansas City and Omaha. This line was closed at many points on June 5 and was restored to service on June 9, but new washouts developed after the rains on June 13, and the line remained out of service until July 1. The most serious damage occurred near Hamburg, Iowa, at the Nishnabotna river crossing.

This Washout on the St. Louis-Burlington Line, Near Alexandria, Mo., Destroyed 250 ft. of Roadbed Fill, 51 ft. High



On June 18, a 7-in. rain at a point about 20 mi. south of Lincoln, Neb., caused a rapid rise of water in a stream known as Salt creek. At Hickman, Neb., this water struck the line extending between Lincoln and St. Joseph, Mo., and destroyed about a mile of track. Approximately 600 ft. of track through the town of Hickman was swept completely off its embankment, while the remainder, although remaining in place, was under-

branch that extends from Holdrege, Neb., to Sterling, Colo.; and at Ravenna, on the line from Lincoln to Billings.

At Cambridge, a wall of water, reported as being 10 ft. deep, struck the single-track main line early on the morning of the twenty-second, and completely destroyed about  $\frac{3}{4}$  mi. of track, much of it being carried 200 ft. or more from its original position. Because of the extensive rehabilitation

east pier, permitting the two east girders to be carried downstream. Also, the east abutment and about 100 ft. of the east approach were washed out. Later, it was found that the creek had scoured a hole extending about 30 ft. below its natural bed. Approximately 185 ft. of pile trestle were necessary to replace this washout. Also, about  $\frac{1}{2}$  mi. of track west of this bridge was washed out in stretches from 100 to 300 ft. in length.

For about 8 mi. west of Ravenna, the track was under water, with about  $1\frac{3}{4}$  mi. of track in this stretch being heavily damaged. The washouts here were 9 to 12 ft. deep and in some places the track was moved more than 20 ft. off line. At one stream crossing in this stretch, two bents of a concrete trestle were found to be scoured to the bottoms of the piles, with settlement occurring in both bents. To repair this bridge, struts were placed between the damaged bents, and further bracing was provided in the form of cables extending to solid piers. When the two bents had thus been secured against further damage the deck slabs supported by them were removed and a temporary pile trestle was driven to replace them. At the same point, 90 ft. of the approach embankment, 15 ft. high, was completely washed out, and this was also replaced by a pile trestle.

At other points near Ravenna, embankments washouts 2 ft. to 30 ft. deep and up to 600 ft. in length developed. At another point where the track is at the natural ground level, the force of the water gouged a hole, or channel, more than 20 ft. deep below the natural ground level, and carried a considerable amount of track off of the roadbed.

The restoration of the deep embankment washouts near Ravenna was difficult. One location required 18,000 cu. yd. of material while another required 10,000 cu. yd. Material and equipment for constructing temporary trestles at these locations were not available. Further, if trestles were erected it would be necessary to fill them later. Fortunately, road-building equipment was available from road contractors in the vicinity and a number of tractor-scraper units were put into service in a short time. The reconstruction work was begun on June 24, as soon as the water receded, with 15 scraper units hauling material 3,000 ft. Later, 10 such units were used on a 2,000-ft. haul. The restoration of this line was finished on July 3.

At Curtis, on the branch line between Holdrege and Sterling, damage was caused by Brushy and Medicine creeks, which join near this point.



Cleaning Up One of the Many Slides Which Blocked the Main Line West of Ottumwa

mined by holes 1 to 4 ft. deep and several hundred feet in length. About two days were required to restore this line. Another heavy rain occurred in the same area on the morning of June 21 destroying all the restoration work that had been done only a few days previously. Again these lines were out for approximately two days.

Later on June 21, and during the early morning of June 22, the entire southeast half of Nebraska was subjected to heavy rains, with numerous small tornadoes developing at local points. The rainfall was centered in the territory east and northeast of McCook, Neb., in the headwaters of Medicine creek, and actually involved two storms which occurred about three hours apart on the evening of June 21, with the estimated rainfall amounting to 5 to 6 in. in each case. Thus, in approximately six hours, 10 to 12 in. of rain fell in this area.

The terrain in this vicinity is fairly rugged, including numerous valleys with steep side slopes, with the result that the run-off from the storms was exceedingly rapid. The resulting concentrations of water struck the Burlington at a number of points, notably at Cambridge, on the main line from Omaha to Denver; at Curtis, on a

work required, this line remained out of service for six days.

Other serious washouts occurred between McCook and Oxford, Neb., on the main line, and similar damage was experienced along the so-called Valley line, which follows the Republican river from Oxford to Superior, Neb., particularly at stream crossings at Orleans and Republican. At Red Cloud, several hundred feet of track were washed off the roadbed and turned over. Numerous branch-lines were washed out, particularly a line extending between Odell, Neb., and Concordia, Kan.

### 50 Miles of Trouble

Between Ravenna and Broken Bow, Neb., on the important line from Lincoln to Billings, the right of way follows Muddy and Beaver Creek valleys for about 50 mi., with 15 stream crossings in this distance. Trouble was experienced at each of these crossings because of scouring action, embankment washouts and other difficulties. Near Ravenna, a three-span plate-girder bridge was destroyed when drift collected against the bridge, apparently causing a deep scouring action which washed out the

The force of the water here carried the main track and three yard tracks more than 200 ft. off the right of way, twisting them together, and requiring that the tracks be completely reconstructed through the town and for some distance each way from it. A temporary track, constructed of salvaged material, was placed in service west of Curtis on July 13. Track material and construction equipment for the restoration east of Curtis were then brought in from the west over the temporary track. Service was restored on this branch on July 20.

In restoring its tracks and bridges following the floods the Burlington made extensive use of power-driven equipment of various types, not only using all available units of its own but, as already indicated, drawing heavily on contractors' stocks of such equipment. A typical example of the types of equipment used is afforded by the work in the vicinity of Ravenna. The equipment used here included two pile drivers, one dragline and one bulldozer, all owned by the Burlington, while the contractors' equipment used at that point included 15 scrapers of 8 to 15 cu. yd. capacity, hauled by track-type tractors. Two other tractors were used to help in loading the scrapers, and two bulldozers were used to spread the material. At Cambridge, two tractor-scrappers, a dragline and two bulldozers were used in the restoration work.

Most of the emergency bridge-repair material used at points west of the Missouri river was supplied from material storage yards at Havelock, Neb., and Sheridan, Wyo., but some of the piling was sent from the company's timber treating plant at Galesburg, Ill.

### In Missouri

As the water reached the Missouri river, that stream rose to new high levels, causing numerous washouts between St. Joseph and Omaha, which were not repaired until July 3 because the water subsided slowly. Another serious washout developed on June 26 near Glasgow, Mo., on the Gulf, Mobile & Ohio line from Francis, Mo., to Kansas City, over which the Burlington has trackage rights for its St. Louis-Kansas City trains. This line, which was destroyed for several hundred feet, was restored to service by the G.M. & O. on July 30.

As mentioned previously, high water on the upper Mississippi caused interruptions to traffic on the St. Louis-Burlington line on June 6. Because the flood causing this trouble subsided slowly, it was not possible to restore the line completely until

July 12. The most serious washout on this district occurred at Alexandria, Mo., where an embankment 51 ft. high was washed out for a distance of 250 ft. This gap was closed by a pile trestle, driven from both ends of the opening. Eighty-five-ft. piling was used in this work.

Following the making of emergency repairs the road began carrying out

certain additional work necessitated by the floods. Such work has included the widening of embankments and the smoothing of cut slopes to avoid slides in the future, and wholesale reballasting of long stretches of track where washouts occurred. It also includes the removal of the silt and other debris which were deposited on the property at many locations.

## Broken Switch Point Derails Passenger Train

A BROKEN main-track switch point caused the derailment, on April 27, 1947, of a Southern Pacific passenger train, resulting in the injury of 77 persons, 73 of whom were passengers, according to a report on the accident by the Interstate Commerce Commission, which is abstracted below.

This accident occurred on the Los Angeles division of the Southern Pacific at a point known as Guasti, Cal., where a siding parallels the single-track main line on the south. The scene of the accident was the east switch of this siding. The switch is near the center of a 25-mi. tangent on which the grade is 0.51 per cent ascending eastward.

The main track and the turnout at the east siding switch are constructed of 112-lb. rail and switch material laid on 24 treated ties per rail length, fully tie-plated with double-shoulder plates, single-spiked, and provided with four-hole angle bars.

The switch rails are of the straight type, 16.5 ft. long, and are constructed with a 1/2-in. by 15-ft. reinforcing bar on the gage side of the web of each rail, the bar being attached by means of sixteen 7/8-in. rivets. Cast-iron heel blocks are provided at the heels of both points, and the switch rails, the stock rails and the closure rails are joined by four-hole angle bars at the heel-block locations, the inside bars being of special construction to permit a hinge motion at the heels of the switch points.

The train involved, No. 6, an eastward passenger train, consisted of an engine and 18 cars. Running approximately nine minutes late, it was passing over the east siding switch at Gausti at a speed estimated at 65 m.p.h., when the third to eighteenth cars, inclusive, were derailed.

After the accident the south, or main-track, switch rail of the east switch of the siding was found over-

turned toward the center of the track. It was broken into several pieces. The first break, of an irregular nature, occurred at a point 2 3/8 in. east of the heel of the switch rail. This break extended diagonally downward and westward to a point where it broke out at the heel end 1 7/8 in. below the head of the rail. The other breaks were the result of a horizontal fracture in the web, which started at the heel end and progressed eastwardly in an irregular line through both angle-bar bolt holes and the most westerly of the rivet holes for securing the reinforcing bar to the switch rail. At the latter point, 19 1/2 in. east of the heel of the switch, the break separated into two legs, one of which progressed upward through the head of the rail in practically a square break while the other extended downward at a slight angle through the base of the rail at a point about opposite the break through the head.

The surfaces of the horizontal break were so battered and polished by friction that it could not be determined if a progressive fracture had existed. However, some discoloration of metal was visible on the surfaces of the horizontal fracture in the area between the two angle-bar bolt holes:

Another eastward passenger train had passed over the switch at a speed of 60 m.p.h. about 13 min. before the derailment occurred, and the crew of this train observed no indication of defective track. Apparently, as the engine and the first two cars of No. 6 passed over the switch, the portion above the horizontal fracture dropped inward and derailed the third car.

On April 14, 1947, the roadmaster and the section foreman removed the angle bars at the heel block and examined the switch rail, and the rail was tested by a detector car on the following day, April 15. Neither of these examinations disclosed any defective condition in the rail.

# Applying Radiant Heating to a Passenger Station



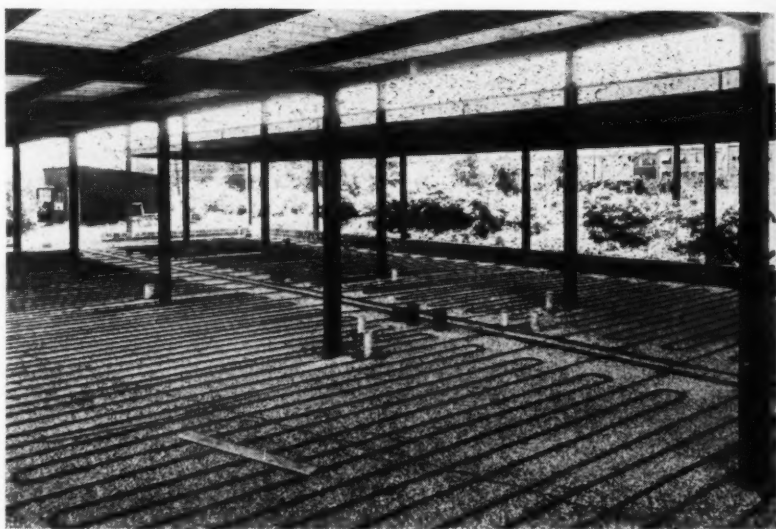
One of the latest developments in heating buildings is that known as radiant heating. In recent years the special characteristics and properties of this system have stimulated a great deal of interest in it among railway building engineers, and a number of installations have been or are being made in a wide range of buildings and other structures. As an aid to those who may have need for information regarding the methods used in designing radiant heating systems, especially for passenger stations, the accompanying article is presented.

Left—Welding the Wrought Iron Pipe Grid for a Radiant Heating System. Below—Example of Serpentine, or Sinuous, Type Radiant Heating Coils of Wrought Iron

IN THE large programs of building construction and modernization planned or under way on the railroads, embracing passenger stations, freight houses, offices, engine houses, etc., proper heating is a prime consideration. The main reason for heating any building, regardless of its size or character, is to establish comfort for those who may be in the structure. To this end, scientists and engineers have been continuously searching for ways and means of establishing the highest degree of indoor comfort in the most economical manner.

One of the latest developments in space heating is "radiant heating"—the system that eliminates radiators and all other exposed devices and operates on a principle entirely different from other systems. In this system, railway construction and maintenance officers concerned with the heating of any building connected with the industry—from passenger station to shop—may find the answer to the ever-present problem of establishing and maintaining maximum comfort for customers and employees, while at the same time they may avail themselves of certain specific advantages in the system.

Such a system already has been installed in one passenger station—the Chesapeake & Ohio's new "vest pocket" model station at Prince, W. Va. Also, radiant heating is now being built into a new Diesel locomotive repair shop at Harrisburg, Pa. A similar method is being discussed for use in passenger coaches.



The principles involved in radiant heating are predicated on the scientific fact that sufficient heat is generated within the human body to maintain comfort at low temperatures. But this self-generated heat is lost in three ways—by radiation to cool surfaces, by the passage of cold air over the skin and clothing, and by the evaporation of body moisture. Of these, radiation losses account for the largest percentage. The objective of radiant heating, therefore, is to warm cool surfaces by means of concealed hot water pipe lines for

the purpose of regulating heat losses due to radiation. Air sweeping the warmed surfaces in the room also becomes warm, thereby controlling convection and evaporation losses. Because the greatest cause of discomfort—radiation losses—are controlled, air temperatures can be 5 to 10 deg. lower than in conventionally-heated buildings. This results in a fresher, more invigorating atmosphere that is free from "stuffiness."

There are other advantages, too. Drafts are eliminated because strong air currents are not needed to carry heat around the room. Fixtures and room surfaces remain cleaner. Architectural designs based upon a more

# a Passenger Station

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liberal use of glass can be employed. Radiant-heated floors "block" down drafts which, in buildings heated by ordinary means, result in excessive heat losses as they sweep against large window areas. All floor space can be utilized because the heating elements are concealed. Comfort is uniform over the entire area. Fuel economies are substantial.

The mechanical differences between radiant heating and other types are few. One of these is that, instead of relying upon small high-temperature elements, radiant systems operate with just one large low-temperature element—generally the floor; sometimes also the ceiling. The same kinds of equipment and controls used for conventional forced hot-water heating are used in radiant-heating systems.

## A Design Problem

As in designing any heating system, the design of a radiant heating system should be based on sound principles of engineering. To illustrate how it is done, a design has been worked out for a typical medium-sized passenger station, which, for the purpose of this discussion, we will refer to as Radiant Station. This station contains a waiting room with 832 sq. ft. of floor area; baggage room, 1048 sq. ft.; boiler room, 196 sq. ft.; ticket office, 137 sq. ft.; ladies lounge, 126 sq. ft.; ladies rest room, 120 sq. ft.; men's rest room, 120 sq. ft.; and private office, 60 sq. ft.

The designing of the radiant-heating system for this station involved three main steps, as follows: (1) The heat losses were calculated on the basis of B.t.u. per hour per square foot of floor surface; (2) the pipe size and spacing, and the operating water temperature, were decided upon; and (3) the boiler, pumps and

controls were selected. The first step is in line with the same procedure used in designing any kind of a heating system. Heat losses, except those for the floor, are calculated by using conductance and transmission coefficients for the various kinds of building materials and the wall openings, also taking into consideration the proper minimum outdoor temperature. In radiant heating, a factor is added—generally 15 to 25 per cent—for downward and edgewise losses to the ground. Experience has shown, however, that these downward losses are negligible in actual operation, but it is considered good practice to include them to provide a reserve for starting up, to take care of exposed piping losses, etc.

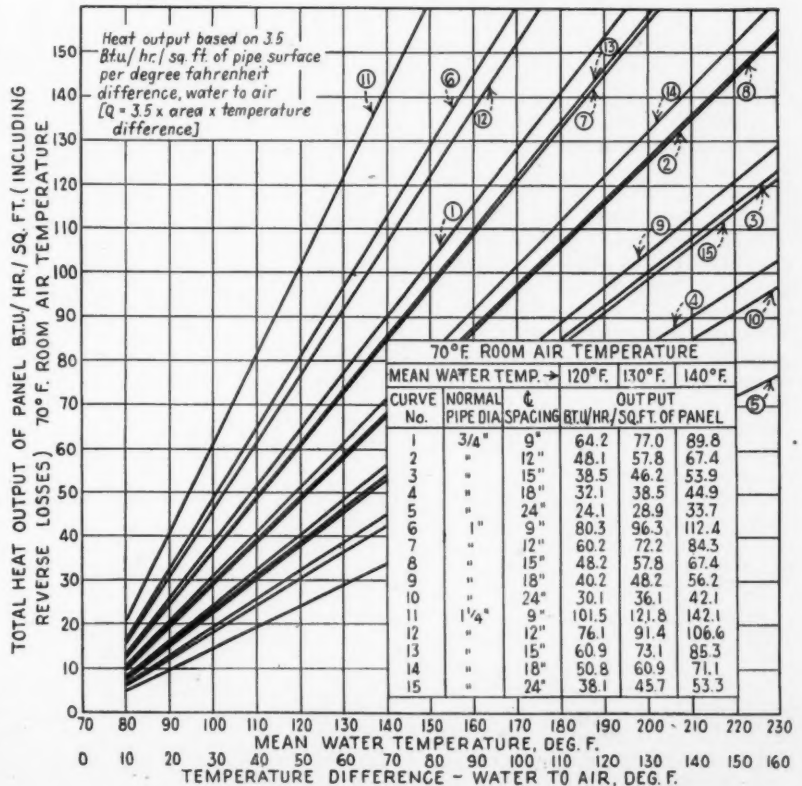
Once the heat losses are known in the terms of B.t.u. per hour per square foot of floor, the next consideration is: How much pipe is re-

quired in the floor to compensate for them? Obviously, a wide variety of pipe sizes, spacing and water temperatures could be used. It has been found that most systems operate efficiently with the water at temperatures of 120 deg to 140 deg. The primary objective is to select a combination of pipe size and spacing and water temperature that will be consistent with an economical installation.

## Chart Is Helpful

Under ordinary conditions, a heat-transmission value of 3.5 B.t.u. per hour per square foot of external pipe surface and per degree of temperature difference, water to air, has been found to be efficient for concrete floors. To simplify the calculations from this point, the A. M. Byers Company, Pittsburgh, has prepared the accompanying chart which shows 15 different combinations of pipe sizes, spacing and water temperatures to produce certain heat outputs. These are based on commonly-used pipe sizes.

The waiting room of Radiant Station affords an example of how the chart is used. This room requires a heat output of 79 B.t.u. per hour per square foot of floor. By locating this figure on the chart, and deciding to use 130-deg. water, it was deter-



This Chart Is Used to Determine Pipe Size and Spacing, and the Mean Water Temperature Needed to Produce Desired B.T.U.s per Hour per Square Foot of Floor Area, With Wrought Iron Pipe Buried in Concrete

mined that 1¼-in. pipe, spaced on 12-in. centers, was the proper combination. Next, the total quantity of pipe required for the entire room was obtained by working out the following formula:

$$P = \frac{HL}{3.5 \times A \times dT}$$

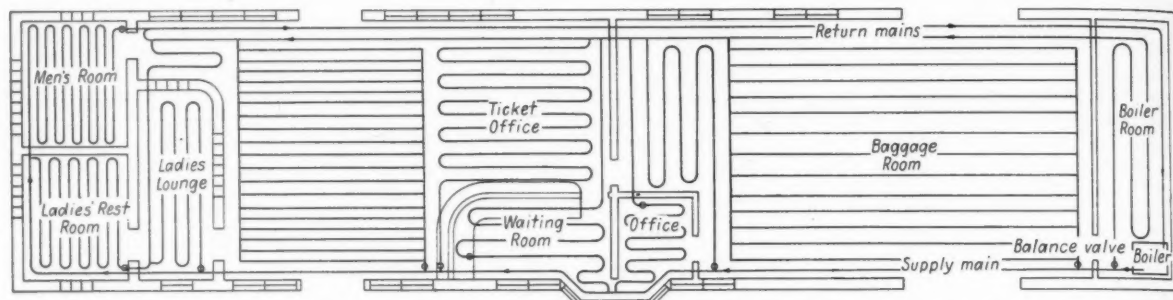
In this formula, P equals the linear feet of pipe required; HL, the total heating load for the room; A, the external pipe-surface area per linear

late water flow. The size of the pump to force water through the coils was based upon the calculated frictional resistance in the entire system. In very large systems, such as those in huge factories, separate pumps may be used for each coil or group of coils.

The question of what type of control to use at Radiant Station was left open because, in a radiant heating system, virtually any of the con-

draulic pressures of 125 to 200 lb. per sq. in. for several hours before the concrete is poured. Any type of finish flooring can be used with radiant heating systems.

Pipes buried in concrete are exposed to some external and internal corrosion, must expand at virtually the same rate as concrete to minimize cracking of the concrete due to expansion and contraction, and must be easy to fabricate. Therefore, the



This Drawing Shows the Radiant Heating Coil Layout for Radiant Station, Designed as a Typical Medium-Size Passenger Station

foot; and dT, the temperature difference between the water and the room air.

The external pipe surfaces per linear foot for various sizes of wrought iron pipe are as follows:

Nominal pipe size (in.)	Surface area per linear foot (sq. ft.)
½	0.22
¾	0.275
1	0.344
1¼	0.435
1½	0.498
2	0.622
2½	0.753

After the total required quantity of 1¼-in. pipe was calculated by the formula given above, the coil pattern was selected. Two different patterns are used most frequently—the sinuous coil and the grid. The latter is generally used for large areas because excellent thermal distribution can be obtained with a minimum of frictional resistance. For the baggage room and part of the waiting room of Radiant Station, the grid design was selected. For the other areas sinuous coils were used. When calculating heat output, however, the fact that the grid headers (supply and return mains) also are responsible for producing additional heat, necessitates that proper allowance be made for them.

So that different comfort conditions could be established as desired without affecting other areas, individual coils or grids were installed in each room of Radiant Station. For example, the design temperature of the baggage room is lower than that in the lounge. Balancing valves were installed on each coil to regu-

late water flow. The size of the pump to force water through the coils was based upon the calculated frictional resistance in the entire system. In very large systems, such as those in huge factories, separate pumps may be used for each coil or group of coils.

#### Thickness of Floor

The thickness of the concrete floor depends primarily upon the engineer's calculations of loads and stresses. Radiant heating coils may be placed at the bottom of the slab

question of which piping material to use is an important one. In the past 10 years, most radiant heating systems have utilized wrought iron pipe because this material—used in large quantities in the railroad industry for locomotive and AB brake piping on rolling stock, and for many other services where the pipe is subject to corrosion and fatigue—has unique properties which make it corrosion-resistant and easy to bend and weld.

#### First Cost

The initial cost of a radiant-heating system today is reported to be no higher than for any forced hot-water system or a good warm-air system. Improving the physical facilities

Radiant Heating Design Statistics for Radiant Station

Room	Feet of 1¼-in. Pipe	Feet of 2-in. Pipe	*Total Equip. 1¼-in. Pipe	Heat Loss in B.t.u.	Floor Area in Sq. Ft.	Heat Load Per Sq. Ft. (B.t.u. per Hr.)
Boiler	63	—	30.5	106.5	196	41.5
Baggage	509	42	127	738.5	1048	53.5
Office	45.5	—	8	57	60	86.5
Ticket Office	56	—	17	80	137	53.5
Waiting Room	508.5	42	109.5	716.5	832	79
Ladies Lounge	80	—	7	90	126	65
Ladies Rest Room	99	—	20	127.5	120	97
Men's Room	132	—	132	11,850	120	99

\*Pipe size is reduced to common denominator—in this case 1¼ in.—to simplify heat output calculations.

or as close to the top surface as two inches, provided properly mixed and cured concrete is used. Coils need not interfere with whatever reinforcing is used for the floor slab. Some designers elect to place reinforcing mesh either below or above the coils before the concrete is poured. After the coils have been welded the entire system should be tested under hy-

standpoints of both comfort and attractiveness, is one of the current objectives of most railroads, and heating is a prime consideration. The advantages of radiant heating, as shown in upwards of 10,000 installations, indicate that it is well suited for use in railroad buildings of various types.

General View of Roadbed Grouting Operations on the D. & R.G.W., Showing the Grouting Outfit in Position on the Roadbed Shoulder and Injection Points Distributed Along the Track



This article describes a new machine that has been developed by the Denver & Rio Grande Western especially for use in roadbed spot-grouting work. In this unit all components necessary for measuring the ingredients and mixing and applying the grout are contained in a single compact machine of the pneumatic type. All operation involved in the work are performed simultaneously, including movement along the roadbed while grouting.

# Roadbed Grouting Outfit

## Has Novel Features

FOR THE limited roadbed grouting operations which have been found necessary on the Denver & Rio Grande Western, this road has developed a highly efficient and effective pneumatic grouting outfit. The outstanding features of this outfit are the unit for mechanical handling of the grout materials, the automatic proportioning and mixing of the grout, and the use of a crawler tractor whereby all components of the grouting equipment, including the grouting unit, air compressor and the working supplies of water and cement, and even sand in some cases, can be towed along the roadbed

shoulder to the different working points as the grouting operations progress thereby increasing the effectiveness of the unit.

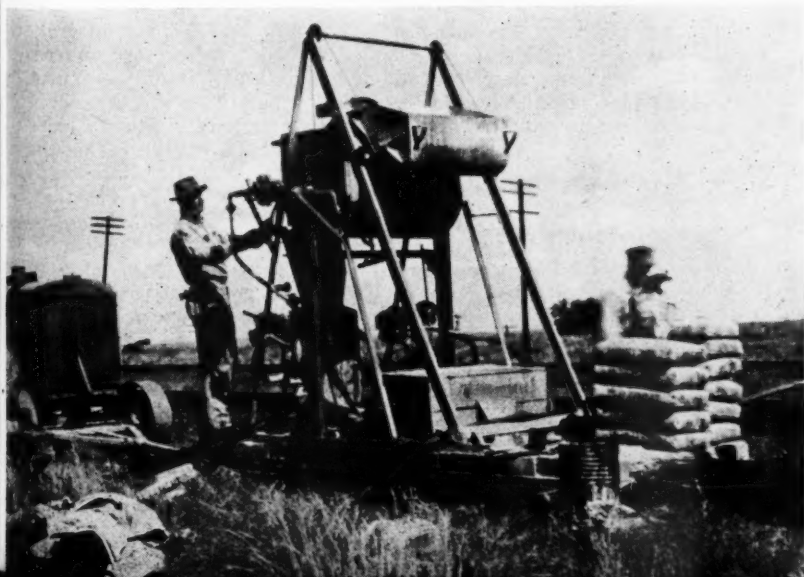
### Clay Underlies Roadbed

Most of the soft spots on the Rio Grande which have called for grouting are located south of Castle Rock, Colo., and at other locations on the main line between Denver and Ogden, Utah. At many of these lo-

cations the track rests on an alluvial fill, predominantly sandy, but with deposits of silt and clay, underlaid with a medium sand which contains water much of the year. Investigation of the troublesome spots revealed a layer of sandy clay, varying from 6 in. to 2 ft. in thickness, between the subgrade and the underlying sand, which held water in pockets. Efforts in the past to remedy this condition, principally by the use of rock drains along the ends of the ties, designed to drain the water from the ballast, through the clay and into the normally wet sand, were, in a measure, successful, but did not effect a permanent cure of the troublesome conditions.

### Mobile Equipment Developed

More recently, portland cement grouting, adding a small amount of emulsified asphalt to the mix as a lubricant, was adopted as a means of stabilizing the track at these locations and at those which had developed since the installation of the



The Front of the Grouting Unit, With the Skip About to Be Unloaded Into the Mixing Chamber Near the Top of the "A" Frame

drains. However, due to the relative small size of the pockets and their scattered locations, the assembly of any large-scale grouting equipment was not considered advisable. This resulted in the decision of the road to develop equipment of its own, particularly suited to its needs, incorporating features of complete mobility. Essentially, the equipment as a whole includes a Caterpillar

motor, Ransome grout pot, and a 10-gal. water-charging tank, all mounted on a single wood platform supported on timber skids. One side of the "A" frame, with stops near the top, acts as a track for the charging skip, which is marked across the face with limit lines denoting the correct quantity of sand and cement for each charge. When raised by the air motor the skip automatically

ously. Hoses are long enough to permit grouting operations 150 ft. each way from the grouting unit, and when a move must be made the entire rig is pulled ahead by the tractor.

### Grouting Force

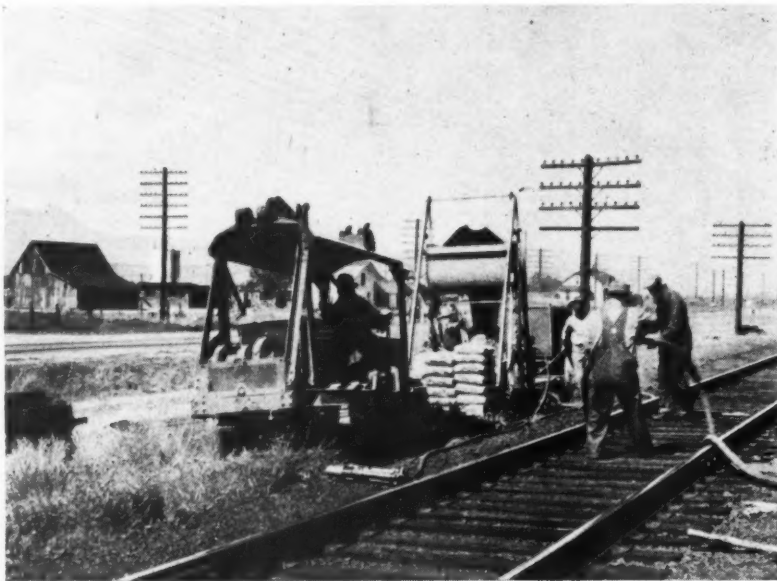
The grouting unit requires but three men for its operation. One man loads the skip with sand, cement and asphalt; a second operates the skip, admits water to the mixing chamber, and mixes and discharges the batch into the grout pot. The third operator controls the flow of grout to the injection points. In addition to these three men, seven others are engaged in other operations, including a foreman, two men driving injection points in advance of the work, three men engaged in the actual injection of the grout, and the section foreman on the territory involved, who points out the spots requiring grouting.

During the progress of the work all supplies are furnished by one of the regular maintenance of way trucks of the road, which has been fitted with a flat tank for transporting water to the outfit reservoir tank. Sand is obtained along the right of way and is screened and bagged in 1¼-cu. ft. lots. This practice of measured sand quantities, together with the 10-gal. water tank on the grouting unit and the load lines on the skip, eliminates any measuring of ingredients during the progress of the work. The actual charge used produces 8 cu. ft. of grout for each mix, which consists of ¼ bag of cement, 2½ cu. ft. of sand, 1 qt. of emulsified asphalt, and 10 gal. of water.

### Hauled by Tractor

As mentioned previously, the grouting unit and air compressor, hauled by the tractor, are moved along the right of way during actual grouting operations. The skid-mounted water tank is usually handled in a separate operation, and is brought up to the work by the tractor between moves of the grouting unit. Long hauls are made by loading the equipment on cars or trucks and moving it by highway.

The grouting operations on the Rio Grande are carried out by the division forces under the general direction of A. E. Perlman, chief engineer, who also directed the development of the grouting equipment being used. Actual development of the equipment was under the immediate supervision of A. E. Neff, supervisor of work equipment.



View Showing the Outfit Being Towed Along the Shoulder of the Roadbed While Grouting Operations Are in Progress

crawler-type tractor, the grouting unit, a 250-cu. ft. Ingersoll-Rand air compressor and a 500-gal. water supply tank, generally lined up in the order named, as well as bull points, injection points, pneumatic hammers and other auxiliary tools used in the actual application of the grout.

The tractor, of 35 hp. rating, is used solely for towing purposes. Equipped with flat-tread steel wheels, the air compressor is used to supply pressure for the operation of the various components of the grouting unit, as well as for the driving of bull points and injection points, and the actual injection of the grout. The water tank, mounted on timber skids and equipped with a ¼-hp. centrifugal pump for the transfer of water from the source to the tank and from the tank to the unit, is of welded steel construction and serves as a reservoir.

### Compact Grouting Unit

The outstanding piece of equipment in the outfit is the grouting unit, which embodies an "A" frame, charging skip, mixing chamber, air

dumps its load into the mixing chamber, which is supported near the top of the "A" frame. The mixing chamber is an open-top "U"-shaped mixing unit with side spout, equipped with narrow mixing paddles on a sealed shaft, and is so mounted that it may be rotated to empty the mix into the grout pot, which is mounted on the platform directly beneath the spout. Operations of this mixer are by the same air motor that operates the skip. The water-charging tank, under air pressure, and pipe-connected to the mixing chamber, is also mounted on the platform.

### Air Supply Lines

An ingenious system of air supply lines provides air under 100-lb. pressure to the air motor and grout pot, and also for charging the water tank, with conveniently located valves for the control of each unit. It also provides air lines for the pneumatic hammers used in driving bull points, and grout lines for placing the grout, all so interconnected that the driving of points, mixing, and injection of the grout can be done simultane-

# Keeping a Motor Car Running



By G. R. Westcott  
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## No. 15 of a Series

In this installment of the series on the selection, care and operation of motor cars Mr. Westcott discusses the issues involved in keeping motor cars running. The effort required in achieving this end is divided into two classes—shop maintenance and field maintenance—and the latter, in turn, is broken down into two sub-classifications—preventive and corrective—which are discussed in detail. Careful attention is given the various questions involved in shopping motor cars, and, finally, the organizational aspects of the problem are explored thoroughly.

WHEN a well-designed and well-built motor car is first placed in use, satisfactory service should be expected from it. Except for minor adjustments of parts that may be required from time to time, it should continue to give good service until, through neglect or long wear, its mechanical condition has become impaired.

In a restricted sense, "keeping a motor car running" assumes that there will be no interruption of its operation due to its condition. In a broader sense, getting it back into service after a failure occurs, may also be considered a phase of keeping it running; and the shorter the time that it is out of service, the more nearly the problem of keeping it running has been met.

There are, therefore, two objectives to be sought: (1) To prevent any

short interruptions in the service of the car due to its condition, and (2) to prevent its being out of service for any long period.

Sometimes a car will be out of service frequently while the operator or maintainer works on it. The length of time out of service may be short each time a failure occurs, but such failures are usually unexpected and no provisions for other transportation will have been made. In the aggregate, such failures may be costly in delays to the gang using the car.

If a car suffers a complete breakdown and requires shopping, there will be a considerable loss of its use while it is being shipped to and from the shop and while being repaired. In such a case, however, if a relief car is made available, the loss of time to the gang may be less than where the car is subject to frequent failures of short duration.

## Two Classes of Maintenance

The work of maintaining a motor car in good mechanical condition may be divided into two classes: (1) Field maintenance, which includes inspections, adjustments, and the making of such repairs as can be carried out in the field without undue interference with the service of the car, and (2) shop maintenance, or the general overhauling of the car for major repairs.

From the viewpoint of avoiding delay and inconvenience to the gang using the car, successful field maintenance is the more important of these two classes. This is especially true because successful maintenance in the field tends to postpone the need for shop maintenance. In a previous article in this series it was noted that, in the hands of a painstaking operator, cars have continued in service for periods as long as ten years without the need for general overhauling. In such cases, it is probable that, in maintain-

ing the car in the field, the work done was more extensive than is common, or perhaps than is desirable; but that there are such cases, emphasizes the importance of field maintenance.

## Field Maintenance

Field maintenance may also be divided into two classes: (A) Preventive maintenance, or the doing of those things that will *prevent* the failure of any part, and (B) corrective maintenance, which is the making of repairs after failure has occurred.

To impress the reader with the relation between these two types of maintenance, there are set up in the accompanying table a few items of preventive maintenance, and opposite each, the corresponding item of corrective maintenance. In each case, if the preventive work is well done, the need for the corrective work may be avoided or delayed.

In the examples shown, the need for the corrective work arises definitely from failure to do the preventive work. Often the relation is not so clearly defined. For example, overloading a car, if persisted in, will hasten or finally cause deterioration or failure of parts, but the direct relation may not be readily apparent. It should be noted, also, that corrective work may be preventive as well. In the tabulation, the cleaning of carbon from cylinder walls, pistons, and rings is set up as corrective work. It is also preventive since the timely attention to it may avoid or delay the need for renewing some of those parts.

## Preventive Maintenance

Care is of first importance in preventive maintenance. Failure to keep the car clean, to lubricate it properly, and to observe other elements of ordinary care tend to impair its mechanical condition just as surely as failure to attend to mechanical features, such as keeping bolts tight and making adjustments.

Inspecting the car is preventive. If a mechanical defect is found by inspection, and corrected at once, loss of service from the car can often be

avoided; but if left until complete failure has occurred much time out of service may result. Through study of the instruction book and training by the maintainer, the operator may learn to discover in his daily inspection

however, he is doubtful of the operator's ability, he will be wise to make the repairs himself. The practice of sending out parts to be applied by the operator without regard to the latter's skill and understanding in

department. A few motor cars may be used by other departments, but by far the majority are employed in maintenance of way work; and no men in other departments can understand the requirements as fully as those who use the cars.

The second desirable feature is that at least some of the mechanics assigned to the work, and especially the lead man, shall have had some field experience. Without such experience, a man may not appreciate how much trouble in the field may be caused by some thoughtless practice in the shop. For example, for convenience in assembling the side bearing of a two-cycle engine, the mechanic may hold the grease seal spring in compression by means of prick punch marks on the crank shaft. He may fail to realize, as a field mechanic would realize, that doing this will prevent the grease seal from functioning when the car is put in service. Many similar examples could be given.

Selecting shop mechanics from the field forces is more likely to be possible where the shop is under maintenance of way control, but even then may be difficult. When this cannot be done, the third desirable feature becomes doubly important. It is that a track should be available on which the repaired car can be tested under conditions approaching those that it must meet in service. If, when the car is returned to service, complaints of improper adjustments or other defects are to be avoided, it is imperative that the man who tries out the car on the test track shall have had experience as a motor car operator or field mechanic.

A test rack on which the engine may be "run in," and the power output measured is sometimes used. It serves a good purpose, but does not meet the need nearly so well as testing the car on a track. The test rack will often fail to disclose unsatisfactory conditions that will be readily apparent when the car is tested on the track.

### Practices Vary

There are some practices in the shopping of motor cars on which there is much difference of opinion. One of these is the exchanging of power plants or frames in the field instead of sending the entire car to the shop. Under this plan, when an engine, for example, is in need of major repairs, while the frame is in generally good condition, an exchange engine will be shipped out and installed in the car. The bad-order engine will then be returned to the shop to be overhauled and again shipped out for use on another car. Where the cars in use are well standardized as to type,

### Relationship Between Types of Maintenance

<i>Preventive Maintenance</i>	<i>Corrective Maintenance</i>
Keeping car in tram.....	Replacing worn wheel
Keeping belt pulleys in line.....	Replacing frayed belt
Keeping bolts tight.....	Renewing parts broken because of loose or missing bolts
Keeping sprockets in line } and chain lubricated }	Renewing worn chain
Keeping chain and sprockets } free from dirt and grease }	Renewing sprocket
Providing suitable gasoline and oil, properly mixed. Keeping ignition parts and carburetor in good adjustment }	Taking down engine to clean out carbon

tion, conditions which, if not corrected promptly, may lead to failure of a part.

The 30-day inspection by the operator and maintainer together should be thorough. This inspection furnishes a good opportunity for the maintainer to train the operator so that the latter's daily inspection will be more thorough.

A form listing features of the car that should be checked for possible defects may be helpful, especially if the operator is inexperienced. Such a form may be used also by the maintainer as a report to his supervising officer on the condition of the car, if such a report is required.

The prompt ordering of parts is preventive. Even though the inspection has been thorough and the need for a part discovered in advance, unless the order is placed promptly and followed through for early delivery of the needed part, the car may become unserviceable before it is received and applied. Failure to give full and correct information in making the order may often delay delivery of a part, and thus result in loss of service of the car.

### Small Shops

Even when all concerned are fully aware of the importance of preventive maintenance and have done all possible to prevent or delay the mechanical failure of the car, the time will come when repairs are necessary. In some cases they may be made by the operator, but often the corrective work must be done by the maintainer. Whether or not the operator is capable of renewing a part satisfactorily is usually well known to the maintainer and he will act accordingly. If he is confident that the operator will do a good job in applying a needed part, he will be justified in shipping the part to the operator for application. If,

their application may be expected to hasten the need for other repairs later.

If necessary, nearly any part of a motor car can be repaired or replaced in the field. However, when a general overhaul is required the work can be carried out to better advantage in a shop; and the work can proceed in a more orderly manner.

The work may be done in small division shops where the mechanics are under the direct supervision of the division maintainer. Such shops generally are not as well equipped as the larger shops, and unless the amount of work is sufficient to occupy the time of two or more men, the work is likely to be interrupted by trouble calls from the field. Doing the work in a small shop has the advantage that the mechanics, having been trained in the field, are better informed as to just what is required. Unless closely supervised, however, having men work part of their time in the shop and part in the field may lead to the neglect of inspections and other preventive work in the field.

### Shop Essentials

In general, shop maintenance is corrective rather than preventive. It should be kept in mind, however, that unless the work is well done, the requirements of preventive maintenance will not have been met. The failure to renew a worn part, the careless or improper adjustment of a part, or even a loose or omitted bolt may call for early field maintenance that would have been unnecessary if the work in the shop had been done more carefully.

This fact suggests three features that are desirable if maintenance in system or other large shops is to meet the requirements of preventive maintenance. The first of these is that the shop should be operated under the control of the maintenance of way

this practice has some advantages.

Another practice on which there is some disagreement is that of reboring cylinders and applying oversize pistons and rings, and the redressing of crank shafts and the application of

hand at the maintainer's storeroom.

Whether either or both of these two practices are advantageous will depend on the type of organization setup for the maintenance of the cars. Generally, they are more favorably con-

shipping, and in standby service, the number of days' work per year performed by a car is likely to be materially less, on the average, than where more maintenance is carried out in the field.

### Maintenance Organization

Like any other undertaking, keeping a motor car running requires some organization of forces. When the number of motor cars in use was small, and there were few, if any, other machines driven by gasoline power, the need for organized maintenance of the equipment was not great. The addition of a large number of other machines driven by gasoline or Diesel power, however, has changed the situation materially. It is now coming to be recognized more and more that if this equipment is to perform its intended function of doing maintenance of way work with reduced man-hours of labor, and at less cost, its maintenance must be put on a stable and businesslike basis. Thus, the problem is no longer simply one of keeping motor cars running, but of keeping a large number of other mechanical devices in operation. Since the requirements in maintaining motor cars and in maintaining the other roadway machines are similar in many respects, it follows that the organization must function for both types.

No one type of organization for this purpose will be suitable for all railroads. Since the purpose of using the equipment is to aid the work of maintaining the property, the organization adopted for maintaining equipment on any particular railroad must tie in closely with that which controls the maintenance of the property.

### One Organization Outlined

The outline given here is one suitable for a road maintaining its property under divisional control. The designations of the separate units of the maintenance of way organization and the titles of the officers and employees may vary according to the practice on the particular road. In this type of organization, the system officer in charge of maintaining the property is the chief engineer of maintenance, and the officer in charge of equipment maintenance is the superintendent of work equipment. Following these in order are: For the districts or grand divisions, the district engineers for the property, and the supervisors of work equipment for the equipment. For the divisions, the division engineers for the property and the division maintainers for the equipment. And finally, for the subdivisions, the road-

(Continued on page 880)

MOTOR CAR INSPECTION REPORT - 19	
Division _____	Type _____ R. R. No. _____
Assigned to _____	Location _____
<div style="display: flex; justify-content: space-between;"> <div> <p><u>ENGINE</u></p> <p>COMPRESSION _____</p> <p>CONNECTION RODS _____</p> <p>SIDE BEARINGS _____</p> <p>BUSHINGS _____</p> <p>WATER HOPPER _____</p> <p>WATER HOPPER PLUG _____</p> <p>WATER HOPPER OVERFLOW _____</p> <p>RADIATOR AND HOSE _____</p> <p>VALVES _____</p> <p>TIMING _____</p> <p>FUEL TANK _____</p> <p>FUEL TANK CAP _____</p> <p>FUEL LINE _____</p> <p>FUEL LINE CONNECTIONS _____</p> <p>CARBURETOR _____</p> </div> <div> <p><u>IGNITION SYSTEM</u></p> <p>BATTERY _____</p> <p>BATTERY CONNECTIONS _____</p> <p>PRIMARY WIRES _____</p> <p>PRIMARY WIRE CONNECTIONS _____</p> <p>SECONDARY WIRES _____</p> <p>TIMER _____</p> <p>TIMER CONTACTS _____</p> <p>TIMER INSULATION _____</p> <p>COIL _____</p> <p>VIBRATOR POINTS _____</p> <p>BINDING POSTS _____</p> <p>SWITCH _____</p> <p>EXTRA SPARE PLUGS _____</p> <p>MAGNETO _____</p> </div> </div>	
<div style="display: flex; justify-content: space-between;"> <div> <p><u>FRAME</u></p> <p>FRAME BOLTS _____</p> <p>NUTS AND SCREWS _____</p> <p>CLUTCH _____</p> <p>BELT _____</p> <p>BELT PULLEYS _____</p> <p>CHAIN _____</p> <p>CHAIN SPROCKETS _____</p> <p>TYPE WINDSHIELD _____</p> <p>DECK _____</p> <p>GENERAL CONDITIONS _____</p> <p>DIRTY OR CLEAN _____</p> <p>REMARKS _____</p> <p>FIELD MAINTAINER _____</p> </div> <div> <p><u>WHEELS</u></p> <p>ALIGNMENT _____</p> <p>GAGE _____</p> <p>TREAD AND FLANGE _____</p> <p>AXLES _____</p> <p>AXLE BEARINGS _____</p> <p>BRAKES _____</p> <p>TOGGLE PINS _____</p> <p>TOGGLE PIN COTTERS _____</p> <p>SHOES _____</p> <p>ADJUSTMENT _____</p> <p>TOOLS _____</p> <p>DIVISION MAINTAINER _____</p> </div> </div>	

Typical Form for Reporting Periodic Motor Car Inspections

undersize bearings. Insofar as the shop overhaul is concerned, there is undoubted economy in this. However, where much of the maintenance is carried out in the field the advantages may be overbalanced by the inconvenience, and often increased expense, due to lack of standardization of parts. Frequently, the information received by the maintainer that a car needs attention is very indefinite as to just what the trouble is. In such a case, there may be uncertainty as to whether the parts required are standard or off-size, and a second trip to the field may be necessary before repairs can be completed. The practice also increases the number of repair items that must be kept on

considered where the maintenance of the cars is carried out largely in division repair shop, rather than in the field.

### A Third Practice

A third practice sometimes used is that of performing all corrective maintenance at a central shop, except such work of minor character as can be done by the operator. Sending a car to the shop for repairs that a field maintainer might make in a few hours time means, of course, a much longer time that the car is out of service. Under such a practice, a considerable number of "relief cars" will be required. Counting the time spent in



**E. J. Brown**  
President,  
*Roadmasters' and Maintenance of  
Way Association*



**F. G. Campbell**  
President,  
*American Railway Bridge and  
Building Association*

# Roadmasters and

FOLLOWING the precedent established last year the Roadmasters' Association and the American Railway Bridge and Building Association will hold their 1947 annual meetings at the same time and under the same roof—namely, on September 16-18, at the Hotel Stevens, Chicago. As last year, the two groups will meet in separate rooms on the third floor of the hotel, although at the opening session and at several other times during the meetings they will be brought together to participate in common meetings or other functions.

The complete programs of the two meetings, including the joint functions, are given below. In both instances it will be noted that the presentation of technical committee reports, six for the Roadmasters and eight for the B. and B. group, will comprise the backbone of the separate sessions, although these will be liberally interspersed with addresses on

Conventions this year, as in 1946, will be held simultaneously at the Hotel Stevens, Chicago, September 16-18. Programs include many interesting reports and addresses

## Program

### Concurrent Annual Conventions of the Roadmasters' and Maintenance of Way Association and the American Railway Bridge & Building Association

Hotel Stevens, Chicago, September 16-18, 1947

(All Sessions Chicago Daylight Saving Time)

#### JOINT SESSIONS

##### TUESDAY, September 16

- 10:00 a.m.—Joint Conventions Called to Order.
- 10:05 a.m.—Welcome by presidents of the Roadmasters' and B. & B. Associations.
- 10:15 a.m.—Greetings from the American Railway Engineering Association, Armstrong Chinn, President.
- Greetings from the Track Supply Association.
- Greetings from the Bridge & Building Supply Men's Association.
- 10:25 a.m.—Opening address by J. H. Aydelott, vice-pres., Operations and Maintenance dept., Association of American Railroads.

#### ROADMASTERS' SESSIONS

- 11:00 a.m.—Address by President E. J. Brown.
- 11:20 a.m.—Report of Committee on Installation and Maintenance of High-Speed Turnouts, R. E. Meyer, Chairman (roadmaster, C. & N.W., Sterling, Ill.).

- 2:00 p.m.—Election of Honorary Members.
- 2:10 p.m.—Report of Committee on Methods of Increasing the Production of Extra Gangs, R. G. Simmons, Chairman (gen. trk. insp., C. M. St. P. & P., Chicago).
- 2:40 p.m.—Address on The Need for Increased Efficiency and Economy in Maintenance of Way Operations and Practices, by S. R. Hursh, asst. ch. engr., maint., Pennsylvania.
- 3:10 p.m.—Address on Prolonging the Life of Cross-ties, by C. A. Rishell, director of research, National Association of Lumber Manufacturers.
- 3:40 p.m.—Adjournment to Exhibit.

#### BRIDGE & BUILDING SESSIONS

- 11:00 a.m.—Address by President F. G. Campbell.
- 11:20 a.m.—Report of Committee on Development and Training of Supervisory Personnel in Bridge, Building and Water Service Forces, F. W. Hutcheson, Chairman (asst. supvr. b. & b., C. & O., Newport News, Va.).

#### TUESDAY AFTERNOON

- 2:00 p.m.—Award of Honorary Membership.
- 2:10 p.m.—Report of Committee on Inspection of Substructures and Underwater Foundations, L. D. Garis, Chairman (gen. bldg. insp., C. & N.W., Chicago).
- 2:45 p.m.—Address by E. J. Ruble, structural engineer, Research Staff, A. A. R., on Recent Tests on Determination of Impact and Stresses in Steel, Masonry and Timber Bridges.
- 3:15 p.m.—Report of Committee on Glued, Laminated Members in Bridges, Lee Mayfield, Chairman (res. engr., M. P. Lines, Houston, Tex.).
- 3:45 p.m.—Adjournment to Exhibit.

# and B. & B. Men All Set for

## Concurrent Meetings

timely subjects. The joint opening session on Tuesday will be characterized mainly by addresses designed to establish the keynote of the meetings, while the one other joint session, on Wednesday afternoon, will include an address and two moving pictures, all of mutual interest to both groups.

There are two other joint affairs to be held during the three-day period, which may be regarded as highlights of the meetings. One of these is the annual banquet, for members of both associations and their families, which will take place on Wednesday evening in the hotel's Grand ballroom. The other is the inspection trip on Thursday afternoon during which members of both groups will have an opportunity to see the largest steel mill in the world—that of the United States Steel Corporation at Gary, Ind.

Motion pictures will comprise an important feature of the programs.

Of the two to be presented during the joint session on Wednesday afternoon one will deal with the suggestion system of the Illinois Central while the other, presented through the courtesy of the Southern Pacific, will be entitled "Maintenance of Way Mishaps." In addition, the Thursday morning session of the Roadmasters' meeting will be featured by a motion picture on safety in maintenance of way operations, to be presented through the courtesy of the Denver & Rio Grande Western.

To help make the three-day period a memorable one for all those in attendance there will be a record exhibit of materials, equipment and devices used in the maintenance and construction of railway tracks, bridges, build-

ings and water service facilities. That this exhibit will be of a comprehensive nature is evident from the fact that, as last year, it will be conducted jointly by the Track Supply Association and the American Railway Bridge and Building Association. Pertinent facts regarding the exhibit, including a complete list of the companies participating and a floor plan of the exhibit hall, are given on the next two pages.

The sessions of the Roadmasters' Association will be presided over by E. J. Brown, engineer of track, Burlington Lines, and president of that association, while those of the Bridge and Building group will be directed by its president, F. G. Campbell, chief engineer, Elgin, Joliet & Eastern.

### WEDNESDAY MORNING September 17

#### ROADMASTERS' SESSIONS

- 9:30 a.m.—Report of Committee on Development and Training of Track Foremen, Chas. Weiss, Chairman (supvr., Pennsylvania, Valparaiso, Ind.).
- 10:20 a.m.—Address on Roadbed and Embankment Stabilization, by R. B. Peck, research professor of soil mechanics, University of Illinois.
- 11:10 a.m.—Report of Committee on Safety in Operation of Motor Cars and Work Equipment, J. E. Griffith, Chairman (asst. ch. engr. m. o. of w. & s., Southern, Knoxville, Tenn.).

#### BRIDGE & BUILDING SESSIONS

- 9:30 a.m.—Report of Committee on Construction and Maintenance of Shop and Enginehouse Floors and Runways, R. W. Gilmore, Chairman (gen. br. insp., B. & O., Cincinnati, Ohio).
- 10:20 a.m.—Report of Committee on Utilization of New Types of Materials in Buildings, B. M. Stephens, Chairman (arch. engr., T. & N. O., Houston, Tex.).
- 11:10 a.m.—Address by George D. Gaw, director, Color Research Institute of America, on The Power of Color.

### WEDNESDAY AFTERNOON

- \*2:00 p.m.—Address by Ralph Budd, president, Burlington Lines, on Problems of Railway Managements and How Our Groups Can Help.
- \*2:30 p.m.—Motion picture "Suggestions Unlimited" (courtesy Illinois Central).
- \*3:00 p.m.—Motion picture "Maintenance of Way Mishaps" (courtesy Southern Pacific).

- 3:30 p.m.—Report of Committee on Advance Preparation of Track for Rail Renewals, R. W. Putnam, Chairman (asst. engr. m. w. & s., S. P., San Francisco, Cal.).
- 4:15 p.m.—Adjournment to Exhibit.

- 3:30 p.m.—Report of Committee on The Economies Which Can Be Derived Through the Modernization of Obsolete Water Stations, H. E. Graham, Chairman (asst. supt. w. s., I. C., Chicago).
- 4:15 p.m.—Adjournment to Exhibit.

### WEDNESDAY EVENING (Grand Ballroom—Informal)

- \*6:30 p.m.—Joint Annual Banquet of the Roadmasters' and Bridge & Building Associations.

### THURSDAY MORNING September 18

- 9:30 a.m.—Report of Committee on Roadmaster's Responsibility in Controlling Maintenance of Way Costs, J. E. Gault, Chairman (asst. ch. engr., C. I. & L., Lafayette, Ind.).
- 10:15 a.m.—Motion Picture on Safety in Maintenance of Way Operations (courtesy Denver & Rio Grande Western).
- 11:00 a.m.—Business Session.  
Election of Officers.

- 9:30 a.m.—Report of Committee on Safety Measures to Protect Employees Within Buildings Against Fire and Accident, S. L. Chapin, Chairman (safety supvr., S. P., San Francisco, Calif.).
- 10:15 a.m.—Report of Committee on Unfilled Needs in Power Tools for Bridge and Building Work, R. W. Johnson, Chairman (asst. engr., C. M. St. P. & P., Chicago).
- 11:00 a.m.—Business Session.  
Election of Officers.

### THURSDAY AFTERNOON

- \*1:10 p.m.—Leave Stevens Hotel by bus for trip through the steel mill of the United States Steel Corporation at Gary, Ind. (the largest in the world), to see steel in the making and rolling-mill operations. Arrive back at the Stevens at 5:30 p.m. (C.D.T.).

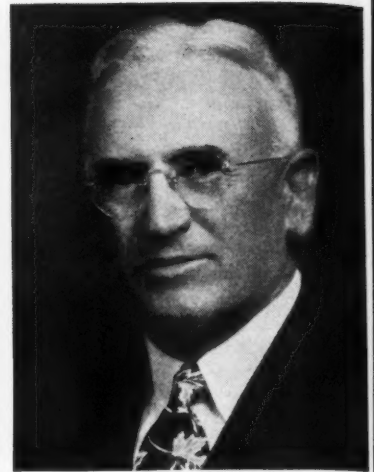
\* Joint Sessions.



H. M. McFarlane  
President, Track Supply Association



W. L. McDaniel  
President, B.&B. Supply Men's Association



Lewis Thomas  
Director of Exhibits

# Suppliers Plan Record Exhibit

Track Supply Association and Bridge and Building Supply Men's group join in offering large display of products at Stevens

THOSE attending the Roadmasters' and Bridge and Building conventions, to be held simultaneously at the Hotel Stevens, Chicago, on September 16-18, will have the opportunity of viewing, for the second consecutive year, a comprehensive joint exhibit of manufacturers' products staged in the hotel's exhibit hall by the Track Supply Association and the Bridge and Building Supply Men's Association. Exceeding even last year's record display, the exhibit will feature the products of 93 companies who will occupy a total of 154 booths. It will open at 12 o'clock noon, Chicago daylight saving time, on Monday, September 15, a day ahead of the conventions, and will continue through Thursday, opening at 8:30 a.m. each day. The closing time will be 6:00 p.m. on Monday and Tuesday, 5:30 p.m. on Wednesday, and 12:00 noon on Thursday.

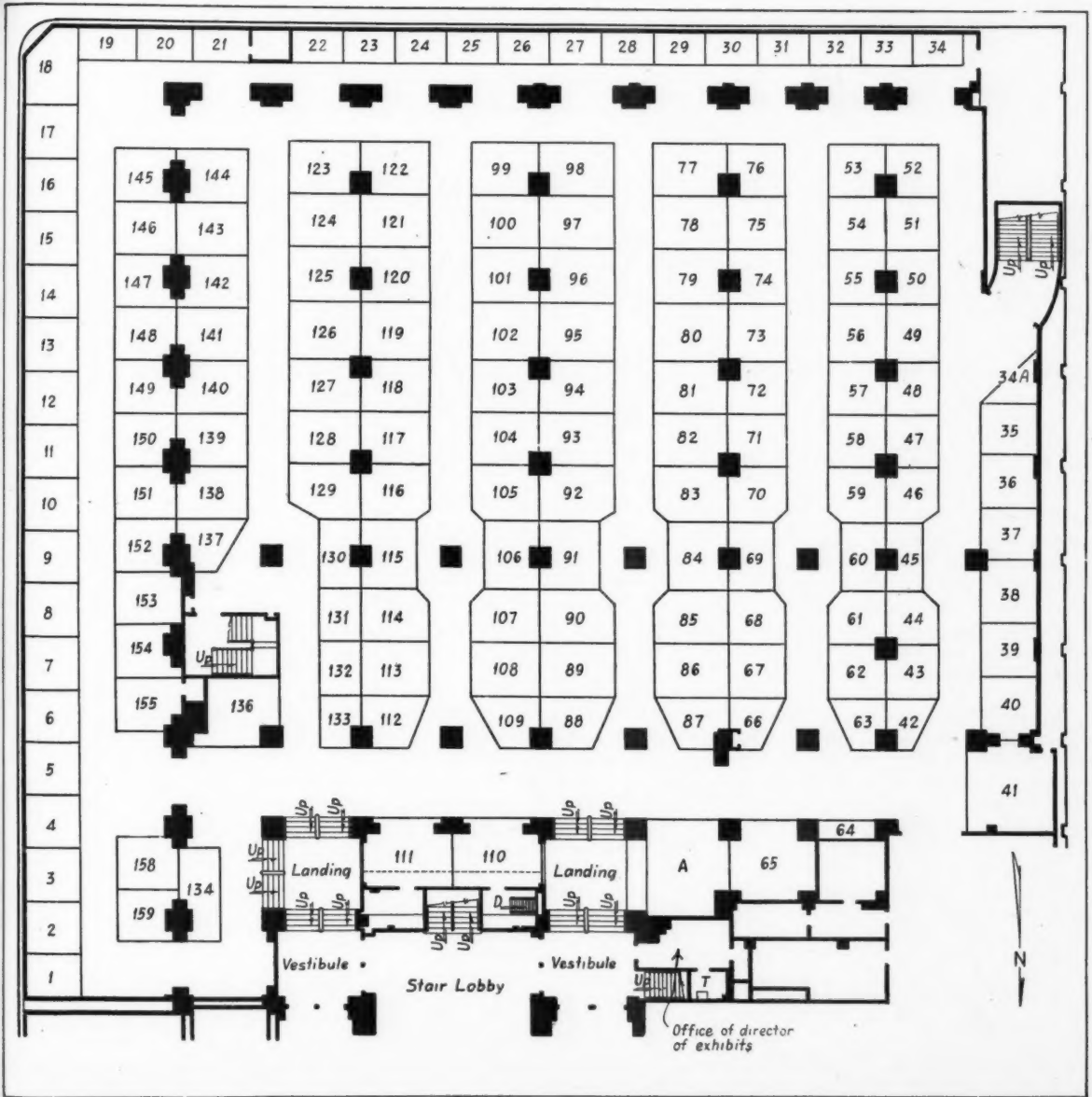
General direction of the exhibit, for their respective groups, is in the hands of H. M. McFarlane (O. F. Jordan Company), president of the Track Supply Association, and W. L. McDaniel (Massey Concrete Products Company), president of the Bridge and Building Supply Men's Association. Lewis Thomas (Q & C Co.), secretary of the Track Supply Association, is serving as director of exhibits. A list of the companies participating in the exhibit, with their booth numbers, is presented here, together with a floor plan of the exhibit hall, showing the exhibit spaces and their respective numbers.

## List of Exhibitors

Achuff Railway Supply Company.....	55
Air Reduction Sales Company.....	90
American Brake Shoe Company, Ramapo Ajax Division.....	91-92
American Fork & Hoe Co.....	121
American Lumber & Treating Co.....	79
Armeo Drainage & Metal Products, Inc.....	A

Austin-Western Company.....	113
Barco Manufacturing Company, not Inc.....	89
Bernuth Lembcke Company, Inc.....	127
The Buda Company.....	42-43-62-63
Caterpillar Tractor Company.....	22-23
Chicago Pneumatic Tool Company.....	41
Chipman Chemical Company, Inc.....	75-76
City Sales Company.....	3
Conley Frog & Switch Co.....	17
Crerar, Adams & Co.....	77
Cullen-Friedstedt Company.....	80
Dearborn Chemical Company.....	70
Drinkwater, Inc.....	49
The Duff-Norton Manufacturing Company.....	109
Electric Tamper & Equipment Co.....	141-142-143-144
Fairbanks, Morse & Co.....	27-28
Fairmont Railway Motors, Inc.....	66-67-68 : 85-86-87
Gravelly Ia-Nois, Inc.....	63
Hastings Signal & Equipment Co.....	64
Hayes Track Appliance Company.....	53
Homelite Corporation.....	45-46
Hose Accessories Company.....	29
Hubbard & Co. (Unit Rail Anchor Company, Inc.).....	103
Illinois Malleable Iron Company, Railroad Division.....	8
Independent Pneumatic Tool Company.....	13
Ingersoll-Rand Company.....	119-120
Jaeger Machine Company.....	36-37-38-39
Johns-Manville.....	107-108
O. F. Jordan Company.....	9
The Joyce-Cridland Company.....	47-48
Kalamazoo Manufacturing Company.....	125-126
The Kershaw Company, Inc.....	18-19-20-21
Koehring Company.....	8
The Lehon Company.....	4
LeRoi Company.....	3-4-5
R. G. LeTourneau, Inc.....	7-8-9-10-11-12
Lima Locomotive Works.....	7
Link-Belt Speeder Corporation.....	14
Littleford Bros., Inc.....	4
The Lundie Engineering Corporation.....	13
Mack Welding Company.....	3
Maintenance Equipment Company.....	11
Mall Tool Company.....	127-128
Marvel Equipment Company.....	13

Massey Concrete Products Company.....	61	The Rails Company.....	78
The Master Builders Company.....	147-148	<i>Railway Engineering &amp; Maintenance</i> .....	115
Modern Railroads Publishing Company.....	61	Railway Purchases and Stores.....	74
Morden Frog & Crossing Works.....	105	Railway Track-Work Company.....	153-154-155
Morrison Metalweld Process, Inc.....	24	Reade Manufacturing Company; Harrop Chemical Com- pany.....	110-111
Murdock Manufacturing & Supply Co.....	106	Roscan Tractor Mower Company.....	30-31-32-33
Nordberg Manufacturing Company.....	81-82-83	Rust-Oleum Corporation.....	51
Northwestern Motor Company.....	96-97-98-99-100-101	Schramm, Inc.....	138
Oliver Iron & Steel Corp.....	137	Sherburne Company.....	26
Overhead Door Corporation.....	16-17	Sperry Rail Service.....	13-14
Owens-Illinois Glass Company.....	130	Taylor-Colquitt Company.....	53
The Oxweld Railroad Service Company.....	103-104	Teleweld, Inc.....	122
The P. & M. Co.....	139	Templeton, Kenly & Co.....	117-118
Pettibone Mulliken Corporation.....	56-57-58-59	Thornley Railway Machine Company.....	152
Pittsburgh Pipe Cleaner Company.....	145-146	Timber Engineering Company.....	129
Pocket List of Railroad Officials.....	131	The Union Metal Manufacturing Company.....	158-159
Power Ballaster Company, Division of Pullman-Standard Car Manufacturing Company.....	35	United Laboratories, Inc.....	69
The Q & C Co.....	116	The Warner & Swasey Co., Gradall Division.....	149-150
Racine Tool & Machine Co.....	54	Warren Tool Corporation.....	124
The Rail Joint Company, Inc.....	112	Woodings-Verona Tool Works; Woodings Forge & Tool Company.....	93-94
Railroad Equipment.....	34A	Woolery Machine Company.....	71-72
Railroad Products Company.....	134		



Floor Plan of the Exhibit Hall, Showing the Booth Numbers

## How to Keep a Motor Car Running

(Continued from page 875)

masters (or other supervisors) for the property, and the field maintainers for the equipment. In each rank the man in charge of maintaining the equipment will report to the corresponding officer in charge of maintaining the property in matters pertaining to the work being done, and to his next superior maintenance officer in connection with the maintenance of the equipment.

### Cooperation Necessary

In a previous article of this series it was pointed out that the attitude of the roadmaster or other supervisory officer is of great importance in determining whether or not a motor car is cared for as it should be. The same holds true in maintaining the mechanical condition of the car. Securing the cooperation of those in charge of maintaining the property must be assumed as one of the functions of those engaged in the maintenance of the equipment.

One of the duties of the maintainer will be the training of the operator. If his instructions as to the handling of the car are not willingly received or

perintendent of work equipment, the supervisor of work equipment may often find some maintainer has developed a procedure that will be valuable to other maintainers.

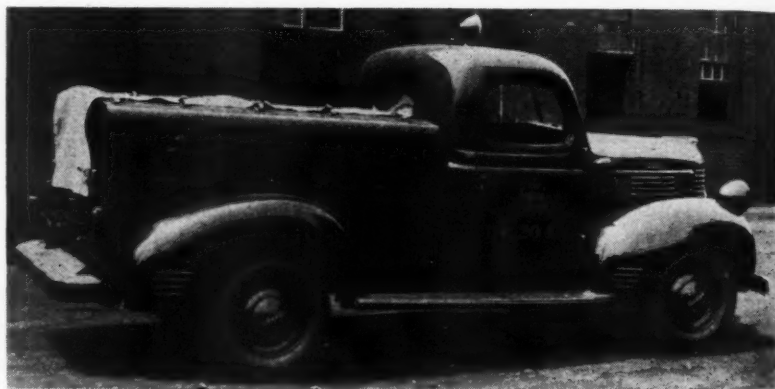
### Superintendent of Work Equipment

The superintendent of work equipment will have general supervision over all motor cars, and he should maintain records of all the cars on the property. In order that these records may be kept up to date, some system of reports from the field will be necessary. The simplest, but least informative of such reports is an annual inventory showing the location and condition of each car. At the other extreme would be reports received monthly or oftener, showing for the period covered, the mileage operated by each car, the cost of operating and

what more complicated than formerly, making necessary certain tools and equipment not previously required. Few of these tools are needed specifically for use on motor cars, as many of them are used on other equipment as well; but the workman who does not have them is seriously handicapped. From the viewpoint of speeding up the work, and that of improving its quality as well, adequate tools should be provided.

No other one item in the way of additional equipment for the maintainer will add as much to his efficiency as an automobile truck, with which he can get to his work more quickly, thus increasing the number of service calls he can make in a day. It will permit, also, his having with him the greater variety of tools and spare parts that he now needs.

The character of the truck will de-



Type of Motor-Car Repair Truck in Use on the New York, New Haven and Hartford

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**"Keeping a motor car running is more than making repairs. To a large degree, it is preventing the need for repairs. To that end, close cooperation and understanding between those in whose service the cars are used, and those specifically charged with their maintenance, is of first importance."**

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are ignored by the operator, he may have to enlist the aid of the roadmaster or other supervisory officer in enforcing their observance. If he still fails in bringing about the desired end, the assistance of the division maintainer through the division engineer, or of the supervisor of work equipment through the district engineer, may be required.

All instructions and advice given should be explicit and supported by the reasons why the observance is necessary. Generally, the better a course of action is understood, the more likely it is to be followed.

Uniformity of practice in maintaining the cars is desirable. While this may generally be outlined by the su-

perintendent of work equipment, and its location and condition.

Preferably, various repair shops on a system should be under the control of the superintendent of work equipment. If they are not, it is essential that he work closely with those in charge of the shops. It will be his function, also, to deal with the purchasing and supply departments to the end that the cars purchased are suitable for their intended use, that purchases are restricted to as few different types of cars as possible, and that the parts and supplies furnished are suitable and available when needed.

The force for maintaining work equipment, including motor cars, should be of sufficient size and adequately equipped. In many cases, the work now required is more than double that needed when motor cars alone were maintained. While increased efficiency of the men, due to better organization and equipment, has been helpful in meeting the need, some increase in the number of maintainers is generally required.

Present motor cars, too, are some-

pend on the conditions on the territory where it is used. A pick-up type is preferred in some cases, in spite of its obvious disadvantage that it does not provide ready facilities for keeping tools and parts under lock to prevent pilferage. A panel-body truck is much better in this respect. If more parts and equipment are required than can be accommodated in a panel truck, a larger truck, with an enclosed body, and equipped as a traveling machine shop, may be used.

Keeping a motor car running is more than making repairs. To a large degree, it is preventing the need for repairs. To that end, close cooperation and understanding between those in whose service the cars are used, and those specifically charged with their maintenance, is of first importance. When repairs are necessary, as they inevitably will be, adequate manning and equipping of the force to which their maintenance is assigned, and the cooperation of the stores department and of the users of the cars, will all be required if cars are to be returned to service promptly.



# What's the ANSWER?

## Retaining Men With Machines

*In what manner is the ability of the railroads to secure and hold desirable men in track-work influenced by the use of mechanical equipment? Is this an important factor today?*

### Youth Mechanically Minded

By S. R. HURSH

Assistant Chief Engineer Maintenance,  
Pennsylvania, Philadelphia, Pa.

With the virtual elimination of immigration as a source of good hand labor and the constant demand of native labor for an ever-increasing income to support a steadily rising standard of living, hand labor has practically disappeared from American industry and the railroads.

Today, ditches are dug by trenching machines instead of by sweating laborers. Cotton is cultivated and picked, potatoes are dug, and corn harvested and husked by machines instead of by migrant swarms of cheap labor. A multitude of small machines and mechanized mass-production services has enabled the housewife to dispense with the maid-of-all-work and still have more leisure than ever before.

The youth of today, educated by the movies, comic books, paper magazines and advertising, to expect easy access to the so-called "good things of life," has a pronounced aversion to anything resembling pick-and-shovel labor. Hence, he is not attracted to the "strong-back-and-weak-mind" class of work that was typical of much of railroad labor for so many years.

Today's youth is mechanically minded. He demands work that yields a good income, that offers some challenge to his ingenuity, and that has some variety. He dislikes regimentation. He does not want to be just a "gandy dancer." In obtaining labor, the railroads are forced, in a greatly restricted market, to compete with industry and the farm, which are both highly mechanized.

Increased mechanization of railroad

track work offers a solution. It gives the intelligent man a chance for rapid advancement to better paying work and involves a sufficient number of new problems to keep up his interest. Track machines must, of course, be kept busy as much as possible to carry the overhead, and this involves the constant moving to new locations as the work is completed at the old. Insofar as possible, efficient supervision keeps the machines busy throughout the year, to reduce the percentage of carrying charges in the total unit cost for work done.

Thus, relatively constant employment is offered and the force tends to be stabilized. The higher-rated positions also tend to hold the better men, as they know that they will lose their seniority on the better-paid rosters if they quit. Hence, the use of mechanized equipment is a most important factor in the ability of a railroad to secure and hold desirable men in track work.

### Machines Keep Gangs Full

By A. E. PERLMAN

Chief Engineer, Denver & Rio Grande  
Western, Denver, Colo.

The use of mechanical equipment in track work has permitted an increased output per man-hour so that rates of pay for machine operators can be justifiably higher than for men doing hand labor.

**Send your answers to any of the questions to the What's the Answer Editor. He will welcome also any questions you wish to have discussed.**

## To Be Answered in November Issue

1. *How important is it to check the air consumption of pneumatic tie tampers? How and when should this be done?*

2. *To what extent can fire-retardant treated woods and protective paints be used in railway buildings? Where can each be used to the best advantage?*

3. *As winter approaches, what measures should the section forces take to prepare for the operation of snow plows and flangers? The mechanical forces?*

4. *What are the advantages or disadvantages of oxyacetylene flame cleaning and drying of railroad bridges? Explain.*

5. *When a track has been cribbed to carry it over a washout, how far is one warranted in going in removing the cribbing as the opening is being filled?*

6. *What is meant by the pH factor in water analysis? What particular significance does this factor have in connection with the treatment of water for cooling and heating purposes on Diesel locomotives?*

7. *What are the special problems presented by insulated joints in track? How can these best be avoided or overcome?*

8. *What are the advantages or disadvantages of equipping building forces with portable wood-working equipment larger than hand-held tools? What is the best way of moving such equipment from job to job?*

The operation of a machine offers more inducement for the returned service man and younger man whom the railroads wish to attract than does work at hand labor. The higher rates permitted by the use of machines enable the railroads both to secure and hold desirable men to a much greater extent than did the use of hand labor in the same operations.

This has been cogently demonstrated by the fact that our fully-mechanized steel gang can be maintained at full man-power requirements, while a surfacing gang—even though mechanized as fully as possible—will not always retain a full complement of men because of the manual labor requirements necessary to this operation.

### Other Factors Important

By W. H. SPARKS

General Track Inspector (Retired), Chesapeake & Ohio, Russell, Ky.

How the use of mechanical equipment influences the ability of the railroad to secure and hold men in track work, is really something to think and write about. This influence has become more noticeable since the regular track laborers had to go into the army. Then, those who were left that knew anything about track work found other work where wages were higher, and generally lighter and cleaner. This left nothing but the older men who, having worked hard for many years, could no longer be depended upon to handle heavy work as well as younger men. However, many of them were urged to be just as fast as ever. So many of them also quit.

Under such circumstances there was nothing else to do but to hire the youngest men and boys. They were willing to do the best they could, but in the light of the past performance of the "old timers," their work was not so satisfactory. Much work had to be done over a second time or oftener to make it hold. This was discouraging to many foremen and assistant foremen who took pride in a good job. Many of them even gave up their service and got other jobs because of the difficulties involved in handling boys, old men, and even women.

Many of the best railroad men who were inducted into the army had only fair education. During their army experience they worked side by side with men who had more schooling. However, these uneducated railroaders did everything the educated men did or could do. This left them with a feeling that, even though uneducated, they could get as much pay as anyone else. That is one reason why the men have not returned to their former positions but, rather, have looked for better work. It may be that the use of machinery, offering higher rates of pay, less manual labor and more opportunities, may be an inducement for these men.

Other things besides machinery can help secure and hold men, such as better housing, located near good schools and churches, good water and

sanitation facilities, etc. There will never again be a time when track labor such as we had in the past will be obtainable, because more boys are going to be educated, and those who aren't

are going to want the same chances as those who are. Machinery cannot do everything; there will always be a need for labor. Therein lies a big problem for the future.

## Cold-Riveted Structures

*What applications, if any, can be made of the cold-riveting process in constructing railroad bridges or other structures? What are its advantages and disadvantages? Why?*

### Unsuited to Field Driving

By A. R. HARRIS

Engineer of Bridges, Chicago & North Western, Chicago

Cold riveting would appear to be applicable generally to the shop fabrication of structural steel for bridges and buildings. However, in view of the limitations on the equipment that can be practically handled and used by field crews, it is doubtful whether cold riveting will find application in erection work.

The advantages of cold riveting are lower costs and the improved performance of the rivets. The cost is lower because of the elimination of the rivet forge, and the labor and fuel required to heat rivets for hot driving. Cold-driven rivets give an improved performance because they can be upset so as to fill the holes entirely, with the result that the rivets function in true bearing and shear. Such is not the case with the hot-driven rivet which shrinks somewhat in cooling.

### Cold-Driven Rivets Better

By E. H. MILLARD

Works Manager, Fort Pitt Bridge Works, Cannonsburg, Pa.

Most engineers who have investigated cold-riveting are, I believe, convinced that a cold-driven rivet is superior to one that is hot driven as to strength and resistance to fatigue action such as rivets are subjected to in bridge girders, crane runways and similar structures. The cold-driven rivet also has the advantage of never shrinking after it has completely filled the hole while being upset.

This is effectively demonstrated by

the cross section of two samples I had made at the Fort Pitt Bridge Works. One is of a  $\frac{7}{8}$ -in. rivet, cold-driven through five plates with a grip of  $4\frac{1}{2}$  in. The other is of a  $\frac{7}{8}$ -in. rivet, hot driven through the same number of plates and with the same grip. The cold-driven rivet completely fills the holes, while the hot-driven rivet, although driven at the same time and under the same conditions, shows a shrinkage in the shank of the rivet. I do not know how much the tension is in the heads of this hot-driven rivet or others because of the shrinkage; but I do know that contraction has sometimes caused the heads of hot-driven rivets to pop off.

There is no problem involved in driving cold rivets in the shop in girders, columns and similar members. The big problem is driving such rivets in the field. Cold rivets have been driven for a number of years in standard water-seal gas holders. In such instances special erection equipment, designed to handle the apparatus that is needed for the cold-riveting operation, is used.

In 1909, the writer was in charge of the erection of eight blast furnaces at Gary, Ind., for the Illinois Steel Company. The last 16 stoves were cold riveted. This was accomplished by erecting two small derricks, supported from the frame of the traveler and its two large booms. These were used to erect the steel and also handle the cold-riveting equipment. It is, therefore, a problem in the erection of bridges and similar structures to design suitable erection equipment for handling the cold-riveting apparatus with the aim of getting as large a percentage as possible of cold-driven rivets in the field. However, the newest development in cold-riveting equipment—a pinch-bug riveter—will permit the cold driving of rivets any place where hot rivets can be driven.

In over 40 years experience in supervising the driving of millions of cold rivets, ranging in size from  $5/16$  in. to 2 in. in diameter, I have never found a properly-driven cold rivet that leaked under pressure from liquid or



gases. If a miscue is made in driving a large cold rivet, it cannot be backed out, but has to be drilled out. This is a further indication that a cold-driven rivet fills the hole, will not become loose under vibration, and develops the full strength for which it was designed.

The secret of driving cold rivets is to control the driving pressure, using only sufficient pressure to assure that the rivet fills the hole, and to give a flat head whose minimum height is  $\frac{1}{4}$  the rivet diameter. Also, the diameter of the flat head of the cold-driven rivet should not exceed  $1\frac{1}{2}$  times the rivet diameter.

A few years ago R. S. Osbourne, who had become interested in cold-driving techniques during his many

years of employment with the Riter-Conley Manufacturing Company—which for many years has been using cold-driven rivets in erecting the tank shells of water-sealed gas holders—developed an attachment which is placed on the yoke-type structural riveter to control its pressure. Thus, rivets of various sizes can be driven at their optimum pressures up to the capacity of the machine. The Fort Pitt Bridge Works has two of the Osbourne attachments on 70-ton machines. These allow successful and economical driving of cold rivets up to and including  $\frac{7}{8}$  in. in diameter. To date, the largest cold rivet we have driven here is  $\frac{7}{8}$  in. However, we are preparing our equipment to cold-drive rivets 1 in. in diameter.

expressed in dollars and cents it has considerable advertising value. Generally, this question is involved in the campaigns advertising our beautiful, modern trains. Consequently, it is highly desirable to provide station facilities that are comparable to the passenger-train equipment in beauty and comfort.

By using upholstered furniture, it is possible to add to the attractiveness of the color scheme in the room. This provides a cheerful, inviting appearance, in contrast to the austerity of wood furniture. Where it is possible to arrange the seating units in groups, various colors may be used to avoid monotony. If these colors are carefully selected, the area becomes both interesting and decorative. This permits the simplification of the design of the furniture and a considerable saving in its cost.

The use of nothing but the best quality of material and workmanship should be considered. In general waiting rooms, leather should be used. In women's retiring rooms, fabrics might be used as they are more in keeping with the character of these rooms and their function. Imitation leather should not be used because it has a short life, yet costs as much to install as longer-lasting material. The use of springs in upholstered furniture should be avoided to prevent shortening the life of the covering, and sponge rubber used instead.

Disadvantages of the use of upholstery are mainly its high initial cost and, to a lesser degree, the cost of its maintenance. The maintenance of wood furniture generally consists of occasional refinishing, whereas, when upholstery become shabby, complete replacement of the covering is required. However, even under very heavy use, a good leather covering should last not less than 10 to 15 years.

I believe that upholstery should be considered only in stations of considerable importance, where more constant policing is possible. In smaller, isolated stations not under careful or continuous supervision, the possibility of malicious destruction is great. Furthermore, smaller stations of less importance are usually so designed that fine upholstered furniture would only be incongruous in them. Possible exceptions would be smaller stations at junction points where there might be relatively lengthy waits, and where the added comfort of upholstery would be attractive to patrons. It might also be used at important resort stations where its greater comfort and more attractive appearance would complement the advertising of the area to develop travel.

## Upholstered Furniture

*What are the advantages and disadvantages of using upholstered furniture in the waiting rooms of new or remodeled passenger stations? Does the size or importance of the station make any difference? Why?*

### Plagues Traveling Public

By L. C. WINKELHAUS

Architectural Engineer, Chicago & North Western, Chicago

During the past decade, upholstered waiting room furniture has come into vogue for both new and remodeled passenger stations. This is particularly true of the more important stations where some degree of attendance can be assured.

Before the war the framework of such furniture was made of nickel or chrome-plated tubular steel. During the war it was necessary to resort to the use of wood for the framework, which was usually bleached to a light color. The upholstering material usually used consists of leather, leatherette, or some other smooth-finish material, furnished in various colors. It is the general practice to use two or three colors of upholstery at each location.

Probably the greatest disadvantage of using upholstered furniture in passenger station waiting rooms is its vulnerability to vandalism or carelessness of patrons. It is regrettable that, because of this, it cannot be maintained economically. The greatest damage is caused by cigarette burns. Other damage results from the placing of hand baggage, tools, sharp instruments, or anything else the patron might be carrying, directly on the seat, instead of on the floor. In this connection it is worthy of note that, when subjected to such careless treatment, wood frames of uphol-

stered furniture become marred easily and require frequent repairs, while tubular steel frames retain their finish indefinitely.

The advantages of installing upholstered furniture in the waiting rooms of new or remodeled passenger stations are, for the most part, of an intangible nature—it is pleasant to look at, comfortable and restful to occupy, etc. However, the favorable comment of the traveling public created by such qualities has a definite value.

### Complements Modern Trains

By L. E. PEYSER

Principal Assistant Architect, Southern Pacific, San Francisco, Cal.

While there are both advantages and disadvantages in the use of upholstered furniture in new or remodeled stations, the former, in my opinion, outweigh the latter. Patrons are invited to use our railway facilities, and the more comfort we can give them, the greater will be their appreciation and kindly remembrance of our service. While this cannot be



## Mechanical Tamping Methods

*What are the relative merits of six-point and eight-point mechanical tamping in multiple-track territory? Does the height of raise or kind of ballast make any difference? Why?*

### Both Methods Have Merit

By ENGINEER OF TRACK

When raising track, it has been standard practice for many years to tamp each side of every tie both inside and outside of each rail. This method was recognized as being the most thorough because it resulted in each tie having ballast packed solidly under it from near each end to a foot inside each rail. Consequently, regardless of what tool was used, raises were always made in this manner. Mechanical tampers were no exception to this rule.

On the other hand, necessity is not only the mother of invention but perhaps the father of experimentation. Faced by too much track to raise and too little time in which to do it, measured in accordance with eight-point tamping performance, someone, somewhere tried other methods of tamping to increase the output per man. Probably in this connection every conceivable method has at one time or another been tried. So-called cross-tamping, where one side of the tie is tamped on the outside of the rail and the opposite side inside of the rail, has been found to give good results on light traffic lines, but to be ineffective in heavy-traffic multiple-track territory.

It is on this class of track that six-point tamping has found some followers, at least for mechanical tampers. In this case both sides of the tie are tamped outside of each rail and only one side tamped inside the rail. We have used this method with pneumatic tampers on tracks having different classes of traffic, various sizes of stone ballast, and on various heights of raise up to three inches.

These experiences would indicate that the practice compares favorably in durability with eight-point tamping on territories where the roadbed is stable, and the height of raise and size of ballast are small. Needless to say, its biggest advantage is the greater amount of track that can be tamped per day with the usual tamping gang.

Users of electric tampers have told me that on small ballast, either stone or gravel, they have gotten such excellent results from six-point tamping that they can maintain their tracks on the usual four to six-year cycle of rehabilitation just as they did with eight-point tamping.

These trials point to the possibility of merit in six-point tamping under some conditions and with some tampers. But until more extensive proof is offered it is doubtful if the tested, eight-point method can be classified as obsolete.

### Requires Thorough Work

By GENERAL ROADMASTER

The object of all tamping, in my opinion, is to pack ballast solidly and uniformly under the tie in such a manner that wheel loads are transmitted to the roadbed with as little shock and settlement of the track as possible. It seems to me that the tested practice of tamping both sides of every tie, inside and outside of the rail—often called eight-point tamping—can do this better than any other method.

## Replacing Broken Rails

*On heavy-traffic territories where 130 lb. or heavier rail is in general use, what is the most effective method of replacing a broken rail using a limited number of men? What other conditions govern the choice of procedure? Why?*

### Really Requires 10 Men

By R. R. MORMAN

Track Supervisor, Baltimore & Ohio,  
Newark, Ohio

The most effective method of replacing broken rails of 130 lb. or heavier, in multiple-track territory, is to use a section gang of ten men and a foreman. If the track is not safe for further traffic, it should be taken out of service at the closest interlocking plant each side of the break. The gang should proceed to the nearest repair rail with five rail tongs. This rail should be placed in the center of the track that is out of service, by the sliding method, then rolled on its side. A flagman, being properly instructed as to where and how to flag, should be sent out in each direction. The remainder of the gang should place a truck car at either end of the rail. Four men on each side of the rail lift the end closest to the truck car high enough for the foreman to move the car under the rail. Next, the men, placing themselves along each side of

I am a firm believer in doing any job thoroughly. Our tracks deserve the best we can give them, and anything less than the best is intolerable. The small amount of extra work that is accomplished by slighting some particular feature is insignificant when compared to the amount of work required to do over again even a small item of work that did not hold up because it was not done thoroughly.

I know that the proponents of six-point tamping do not recommend it as a stop-gap measure, but as one which they believe is as good in particular localities and under particular circumstances as any other, and as one that gets more accomplished with comparable forces. However, I have yet to see the piece of equipment that, when used on one side of a tie, will tamp ballast solidly and uniformly under that tie and not require a lot longer time to do it than if the job were done by two units operated on both sides. When such equipment becomes available I will be more than agreeable to use it, but it must do the job thoroughly and not be something that just saves two men this year but requires eight men next year to make its work acceptable.

the car, push it toward the center of the rail until it balances.

The rail is then transported to the location of the broken rail where it is matched with the one in track. It is then rolled off the truck to the outside ends of the crossties. Caution should be used in unloading a rail in this manner so that the ends of the rail hit simultaneously. Otherwise it might bounce and cause a personal injury or become bent.

Four men, one on each side at each joint remove the bolts, while the remainder take off the rail anchors, pull the spikes, and plug the spike holes. The broken rail is shoved toward the center of the track with lining bars, and the replacement rail rolled into position with rail forks. The broken rail can then be loaded on the truck car or set out of the track with tongs.

This method, in my opinion, is the best, but to be effectively used, it requires a minimum of eight men, six of whom are lifting 141 lb. each. If the break occurs after working hours and it is impossible to get eight men,

some other method has to be used. This will be more costly and will cause the track to remain out of service for a much longer period of time.

### Ingenuity Often Necessary

By JOHN L. DELL

General Foreman, Baltimore & Ohio,  
Willard, Ohio

Because of the variety of circumstances under which failed and broken rails are discovered and replaced, I am of the opinion that it is impossible to formulate a definite procedure for handling this problem. The most difficult part of rail replacement is the transportation of the repair rail to the location of the break. The expediency and efficiency with which this is handled depend entirely upon the ingenuity of the crew that is called to change out the rail.

The first consideration in the event of a broken rail must be adequate protection for trains. This always requires the services of two flagmen, one for each direction. If the repair crew consists of seven or more men with a motor or push car, it is often possible to replace a broken rail very quickly, when rails are stocked at mileposts. Sending out one man as flag-

man, the remaining men can go in the opposite direction, load the repair rail and, leaving a man as flagman, return to the broken rail and replace it. Six men can, without great difficulty, load a rail of 130-lb. section on a motor or push car by lifting one end of the rail onto the car, and then sliding the car under the rail until it balances. If the gang consists of as few as four men, real ingenuity is required to make repairs without great delay. To attempt to load a 130-lb. rail with less than six men is an invitation to personal injury.

A rail can be transported quite easily by jacking it up against the bottom of either the motor car or push car and holding it there by means of a sling made with a 10 to 12-ft. chain. Wedges or a jack can be used to tighten the chain. I have seen a gang of five men transport a 130-lb. frog in this manner and change it out in 30 min., using two men as flagmen.

It is important that the tools necessary for changing rails should be carried at all times by each track crew. There is too great a tendency for small gangs to lighten their cars by leaving tools behind. Every car should carry a maul, claw bar, wrench, track jack, lining bar, track gage, and a few spikes, regardless of what type of work is planned for the day.

cially if it contains no white lead. Paint dries as fast on dry redwood as it does on other dry woods. However, on cypress that is unusually rich in the oils characteristic of that wood, the drying of paints lacking white lead may be slow, even when the cypress is dry.

The differences between woods show up most strikingly in their effect on the durability of paint coatings. On the average, woods of Groups 1 and 2, hold paint longest. Woods of Group 3 stand in an intermediate position; and woods of Groups 4 and 5 are likely to let coatings come loose soonest. For paints that contain no zinc oxide, such as pure white lead paint or red freight-car paint, no distinction need be drawn between woods of Groups 1 and 2; but for paints that contain zinc oxide, woods of Group 2 are slightly inferior to those of Group 1.

In any species, the higher grades of lumber are superior to the lower grades for painting. However, in cases where minimum cost is emphasized to the point of admitting sacrifice in appearance, it has long been common practice to use common grades of lumber despite their poorer paintability.

The properties of softwoods that determine their paintability are density, ring count, and ring angle. These are important because, when paint coatings become old, brittle, and begin to wear out, they come loose from the bands of dense, hard, dark-colored summerwood long before they break away from the lighter, softer springwood. The wider the bands of summerwood the sooner paint sloughing sets in.

A high ring count, that is, a large number of growth rings per inch radius of the log, favors good retention of paint. When density and ring count are the same, edge-grain boards, in which the bands of summerwood intersect the principal surface nearly at right angles, present narrower bands of summerwood and better paint retention than flat-grain boards, in which the growth rings are approximately tangent to the principal surface. Finally, it is found that the side of the board nearer the bark of the tree, toward which the growth rings are convex, often holds paint better than the side nearer the center.

Painting is normally the largest item in the cost of maintenance of wood buildings. For permanent buildings, especially if they will be seen by many of the railway's customers, it will usually be worthwhile to pay a reasonable premium for a kind of wood that holds paint well. For siding and trim of important buildings

## Paintability of Various Woods

*What is the relative paintability of various woods? What effect does this have on the choice of wood for use in railway buildings? Why?*

### Several Factors Govern

By F. L. BROWNE

Chemist, Forest Products Laboratory, U. S.  
Department of Agriculture, Madison,  
Wis.

The native woods of the select grades (those essentially free from defects) are classified for paintability into five groups of which the first is considered the most satisfactory.

**Group 1**—Western red cedar, other cedars, redwood, and southern cypress, all of which are softwoods.

**Group 2**—Eastern white pine, western white pine, and sugar pine, all of which are softwoods.

**Group 3**—Firs, hemlocks, spruces, and ponderosa pine among softwoods; aspen, basswood, cottonwood, magnolia, and yellow poplar among hardwoods.

**Group 4**—Douglas fir, western larch, and southern yellow pine among softwoods; beech, birch, gum, and maple among hardwoods.

**Group 5**—The hardwoods with pores larger than those in birch, such as ash, butternut, chestnut, elm, hickory, oak and walnut.

The amount of paint consumed in painting smoothly-planed surfaces does not differ greatly for the various woods. Woods of Groups 1 and 2, and the lighter woods in Group 3 may consume as much as 10 per cent more primary paint than other woods, but the increase is negligible by the time the finish coats have been applied.

Woods of Group 5 are unsuitable for painting by the usual procedures of house painting, because brushing or spraying does not fill and level off the large pores in the woods. Both the appearance and durability of the paint job suffer in consequence. For good painting the woods of Group 5 require an extra preliminary operation, namely, the application of a paste wood filler.

Although the drying of paint usually depends on other factors, there are circumstances under which drying may be retarded on some woods. On wet redwood or cypress, paint may be exceedingly slow in drying, espe-

where all the requirements for structural strength are provided by concealed structural members and sheathing, paintability, including the cost of paint maintenance, may well be the sole basis of the choice of lumber.

When the exterior covering of side walls is expected to supply structural rigidity or to withstand unusual mechanical wear or abuse, it may be necessary to choose a strong wood regardless of paintability. In general, the strong woods are the less desirable for painting. Whenever possible, the best compromise between strength and paintability can usually be obtained by using edge-grain boards of denser wood in a select grade.

### A Few Rules Helpful

By SUPERVISOR BRIDGES and BUILDINGS

Any clean, dry wood can be painted, but how effectively it will be covered, or how long the coating will last depends on many factors. No one species of wood can be said to be the best for painting because all species vary somewhat in texture and density, which may even vary somewhat in the same board. These characteristics have more to do with how satisfactory the paint wears than anything else.

A few general rules may be used as

guides in choosing lumber that will paint well: (1) Select grades of softwoods paint better than hardwoods; (2) springwood in any species retains paint longer than summerwood; (3) the higher grades in any species have a better paintability than the lower grades; (4) a large number of growth rings per inch indicates a wood that will retain paint quite well; (5) edge-grain boards offer better paint retention than those that are flat-grained; (6) that side of a flat-grained board that has the growth rings convex paints better than the other side; (7) the stronger woods are not as good for painting as the weaker ones.

While there are other criteria by which the paintability of woods may be further judged, it is doubtful if the average railroad painter or carpenter will need to consider them in making his choice of woods. On the other hand, knowledge of these facts will assist the carpenter in his use of boards that must be painted and will result in better looking buildings and lower paint maintenance costs. It would certainly be regrettable, for instance, if a carpenter, not having knowledge of these simple rules, should nail a flat-grain board to a building so that the concave growth rings were to be painted, when by merely turning it he could have obtained a much better surface for paint.

## Having Garages Repair Trucks

*What are the advantages or disadvantages of having highway trucks repaired by private garages rather than by company forces? Does the extent of the repairs necessary make any difference? Explain.*

### Delay, Not Cost, Decides

By SUPERVISOR OF TRACK

There is no question in my mind but that the repair of highway trucks exclusively by company forces should be the goal toward which we should aim. To realize that goal, however, requires an extensive work-equipment repair organization, in fact, as well as in theory. Our expanding use of work equipment is continually outgrowing the organization and facilities set up for its adequate maintenance and repair. We always have an organization and plan of action, but too often it is inadequate for the demands made upon it.

Our trucks, like other pieces of work equipment, are assigned specific duties, usually involving the program of work for at least one, or often more than one, gang of men. When a truck is out of service for even short

periods of time, the efficiency is impaired of all men whose work is associated with it. That costs money. The loss is an intangible thing felt only by those closest to it. Unless another truck is hired to replace the one broken down and a rental bill obtained, it is sometimes hard to convince some of our people of the extent of the loss.

Of course it is cheaper, regardless of what repairs may be necessary, to load the truck up and ship it several hundred miles to a company shop where it will fall in line and be repaired in its turn. When the repair charges reach the accounting office and are compared with the bill for similar repairs made in a garage, it is only natural that the latter will be higher. But, while the railroad as a whole may have gained by a lower expense item, I and my territory have lost because of the intangible losses incurred by less work being done and the neces-

sity for rearranging truck and gang schedules, etc.

Consequently, except for general overhauling which has been anticipated and programmed, I am in favor of having highway trucks repaired by private garages or repair shops in my own territory, where I, as a customer, may demand action and quality of workmanship, and get it. In every case where I have had such repairs made, the result has been excellent, both as to the quality and durability of the repairs and as to minimum length of time out of service.

On the other hand, I favor a company work-equipment repair organization of such a nature that its repairmen can carry out preventive maintenance programs in such detail and with such effectiveness that breakdown failures will not occur. If failures do occur, company repair facilities and mechanics must be adequate to equal the best performance possible to obtain from private garages.

### Prefers Company Forces

By R. W. PUTNAM

Assistant Engineer Maintenance of Way and Structures, Southern Pacific, San Francisco, Cal.

The disadvantages of having work done in private garages are: (1) The time in which the unit is out of service; (2) the class of workmanship involved; (3) inspections are necessary to assure that all work is done in accordance with agreement; and (4) the expense incurred.

All of our trucks have been placed under a Preventive Maintenance Program which provides for periodical inspections that keep the maintenance mechanic informed of the exact condition of each unit, and for repairs to be made at given mileages. Under this system materials can be obtained and preparation made for these repairs before the unit is taken out of service. The company mechanic performing this work is responsible for good workmanship, rather than for endeavoring to come within an established price for the job.

To be certain that new parts are installed in accordance with an agreement with a private garage, it is necessary to have a man, familiar with such work, inspect the parts removed and check all bills for accuracy.

It is calculated that considerable money can be saved by using company forces as the same supervision is used that now handles the various units of work equipment. The extent of the repairs does not influence our decision to do the work with company forces.

## Power Pipe-Threading Machines

*Is it practicable to equip water service employees with portable, power-driven pipe-threading machines? What considerations are involved?*

### Power Tools Essential

By C. E. RUSSELL

Supervisor Water Service, Illinois Central,  
Chicago

With the present high wages and material costs it is essential that any force of men be equipped with power tools and equipment consistent with the type and amount of work to be performed. To do so will accomplish any one or all of the following satisfactory results: (1) Reduce the number of men required to perform the work by hand methods; (2) reduce the time needed to complete the work; and (3) result in better workmanship.

There are several manufacturers producing electric-powered pipe-threading machines for use on pipe ranging in size from  $\frac{1}{8}$  in. to 2 in. These are ideal for general shop use and are small enough to be moved to any location where electricity is available. They can also be operated by a small, portable electric generator.

Few piping installations, of 2 in. or smaller, are ever made without extensive use of nipples of various lengths. With the nipple chuck, available for these machines, nipples can be cut as needed, and in lengths to fit individual requirements. Bolt dies are also available for these machines, which would increase their use, and make available bolts which are frequently difficult or impossible to secure in the lengths required. The size and type of machine selected should be consistent with the amount of work usually performed and the availability of the permanent type of machine generally found at most mechanical terminals at division or district points.

Although welding has supplemented threaded joints to a large extent in installations of large pipe, it is still necessary to provide such joints for the inclusion of valves, special fittings and final connections to the unit which the pipe line is to serve. Small, portable, electric-power drives are available for use with hand ratchet dies. These provide an excellent combination for the relatively small amount of work in piping of the larger sizes.

There is also available an electric-drive machine which can be used with either hand pipe or bolt dies or with large-size ratchet dies by use of an extensive drive equipped with universal joints. This machine employs a revolving chuck to hold the pipe or bolt, leaving the hand dies stationary.

It also has a reversible motor to facilitate the removal of the dies when the threads are completed. The quality of work produced by this machine is dependent not only on the condition of the dies but more especially upon the care and skill used by the operator. In my opinion, this would be an ideal combination unit with which to equip a small force of men who would not have the volume of work that would justify the purchase of more than one power machine.

### Base Use on Economics

By MASTER CARPENTER

The question of whether water-service employees should be equipped with portable, power-driven pipe-threading machines is not one that can be answered with a plain "yes" or "no" adding a few simple arguments to support the contention. The final answer must be based on economics, and it will not be the same for all conditions. It will be dependent on the following factors: (1) The organization of the water service forces; (2) the arrangement and extent of the territory covered by these forces; (3) the transportation facilities provided for the employees to cover their territory; and (4) the type of facilities to be maintained and the type of piping to be installed in future construction and maintenance.

If the maintenance forces are, or can be, organized into gangs of six or more employees under the supervision of a foreman, and are qualified to perform all kinds of plumbing work, the answer is undoubtedly "yes." The amount of pipe threading performed in such cases would justify the use of power-driven devices as such devices do not affect economies unless they are regularly or frequently used. Aside from the fact that idle tools are idle investment, one of the reasons for this is that, through regular use, the machine will have experienced men to operate it and will, therefore, perform most efficiently. Another reason is that its value will be realized and understood by the employees who use it.

Conversely, if the maintenance forces are organized on a basis of widely scattered small groups of one or two men, whose work consists mostly of water station maintenance, the use

of such machinery is definitely not practical or economical. The practice of sending special equipment from group to group for use when needed is seldom, if ever, satisfactory. Frequently, the equipment is needed at several locations at the same time, and again may be idle while not needed at any location. Maintenance work can seldom be programmed on the basis of the availability of the machines. Furthermore, machinery used infrequently and by numerous operators is generally mishandled, as the operators are neither well versed in its operation, nor are they interested in seeing that it is well maintained.

If the territory covered by the maintenance group includes the concentrated facilities of terminals, yards, docks, wharves, etc., where there is an abundance of piping of various kinds, including, in addition to wash and toilet facilities, air, steam, and gas lines, the answer again will be "yes." While if the territory cannot be so arranged but includes mostly widely scattered small stations and outlying water stations, the answer must be "no." Economy can then be effected by the employment of local contractors to maintain the existing facilities or install new ones. If the territory is so arranged as to include, with the concentrated facilities, some outlying ones, and the forces organized on a basis of larger gangs, the power equipment will be entirely practical if proper transportation facilities are provided.

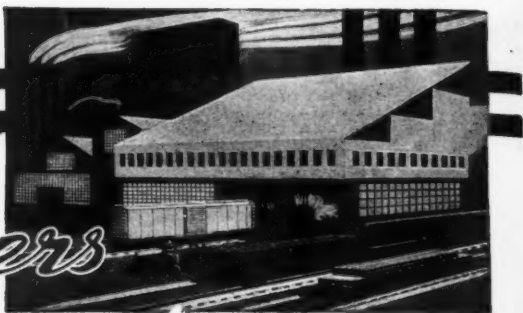
If the facilities to be maintained include mostly water stations where the piping is cast iron in large sizes, the pipe-threading equipment cannot be used with any degree of economy.

The last factor to be considered, but by no means the least important, is the type of piping to be installed in the future. There are on the market, in increasing quantities, copper tubing and several types of soldered joints which require no threading. Also, the development of welding equipment requires the consideration of all-welded construction, while somewhere in the future lies the extended use of plastic tubes for various types of piping.

To arrive at any satisfactory conclusion, each case must be studied separately, and if all the factors indicate a favorable application, it is practicable to equip the maintenance force with power pipe-threading machinery. Generally speaking, the use of power-driven equipment and machinery should be extended by the reorganization of personnel, rearrangement of territories, and the furnishing of transportation facilities and correlated equipment.

# PRODUCTS

## *of Manufacturers*

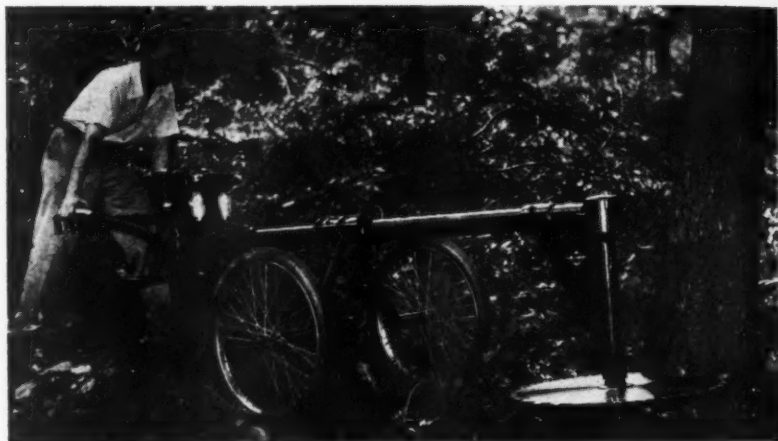


(For additional information on any of the products described in these columns, use postcards, page 829)

### All-Purpose Electric Impact Tool

PRODUCTION of a new, all-purpose, electric impact tool, capable of applying and removing screws and nuts, of performing drilling and reaming operations, and of doing a variety of other work, has been announced by the Ingersoll-Rand Company, New York. Designated as size 4U, the new tool weighs only 6½ lb. and has an overall length of 10½ in. It operates on 110-volt alternating or direct current at a free speed of 2,000 r.p.m., and is said to deliver 1900 "rotary impacts" per minute under load.

In operation, the impact tool performs as any conventional electric tool until the resistance to spindle rotation reaches a certain amount. Then, it is said, a patented mechanism converts the power of the motor into "rotary impacts," which exert a more powerful turning effect, enabling the machine to perform heavy work, such as extracting broken set screws and studs, without imparting a torque reaction to the operator. An outstanding advantage of the impact mechanism is said to be that it permits the spindle



The Mall Model 30 Portable Circular Saw

to stall completely while the motor continues to run, thereby eliminating burnouts caused by overloading.

As delivered, the 4U tool includes a set of accessories, including six hexagon sockets, a Collet-type chuck, a taper socket, an adapter sleeve, and an Allen wrench. Other accessories may be obtained, if desired.

at intervals of 30 deg. The gas engine is the newest Mall design, and is equipped with an automatic clutch which is said to prevent damage to the transmission or bearings if the blade should become jammed. The engine is of the two-cycle type, with rope starter, and is constructed of aluminum and magnesium alloys for light weight. The power unit on this saw is interchangeable for use on the Mall chain saw and bow saw, so that a single engine may be used on all three machines.

On Model 30, which weighs 200 lb., the saw blade is 30 in. in diameter, will make cuts up to 22 in., and operates at 1,200 r.p.m. through a 4-to-1 gear reduction ratio. Model 36 has a 36-in. saw blade and, with a 6-to-1 gear ratio, has a blade speed of 800 r.p.m. According to the manufacturer the blade cannot break while cutting, and has specially sharpened and set teeth which cut on the entire length of the tooth. The saw may be operated by one man, with all operations, including indexing the blade at any of the 30-deg. settings, being controlled from the engine end. It is said to be adapted for clearing and fire cutting along the roadway, ranging from brush work up to trees 22 in. in diameter for Model 30.

### Portable Circular Saw

A PORTABLE wheel-mounted, self-powered circular saw, available in two sizes, and known as Models 30 and 36, has been developed by the Mall Tool Company, Chicago. This unit embodies a gasoline engine mounted at one end of a tubular frame, an auxiliary shaft and saw blade mounted at the opposite end, and, about midway between them, a two-wheel, pneumatic-tire mounting.

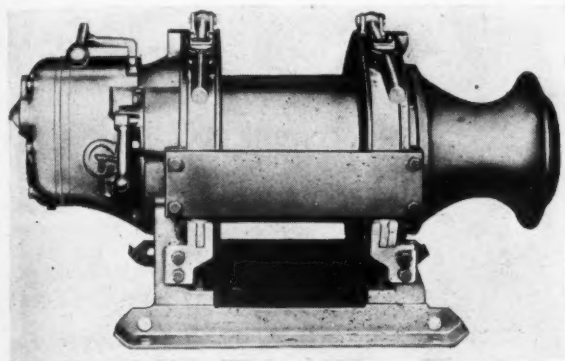
The tubular frame encloses a drive shaft connecting the engine at one end with a set of enclosed gears at the opposite end, by which power is transmitted to the auxiliary shaft, mounted at right angles to the main shaft. The auxiliary shaft may be rotated on the frame, with respect to the main shaft, through 360 deg. and set or indexed



Drilling a Hole for a Hanger Strap with the New Electric Impact Tool

## CP Utility Winch

THE Chicago Pneumatic Tool Company, New York, has announced the development of a utility winch, with air-motor, electric-motor, or gasoline-



Left—The CP Utility Winch with Air Motor

engine drive, which is said to handle loads up to one ton and as far away as 1100 ft. The unit embodies a combination drum and cathead, with the power unit integral with the winch, located at one end opposite the cathead. The winch is controlled by two levers, one a clutch lever, and the other a brake lever. A safety lock is provided in case of power failure. When air power is used the motor is interchangeable with any standard flange-mounted 7½-hp. electric motor.

The outstanding improvement in the design of the winch is said to be the precision control, which eliminates bouncing and jerking. The feature of the new winch, according to the manufacturer, is the combination cathead and drum arrangement, by means of which the cathead can be operated independently of the cable drum. Thus a load can be held aloft by the drum cable and maneuvered by the cathead rope.

The new winch is said to be applicable to any one of the numerous uses to which a winch may be put for either single or multiple-line hoisting, including spotting cars, handling timbers and other operations where accurate spotting and control of the load is necessary.

## Airco Welding Rod

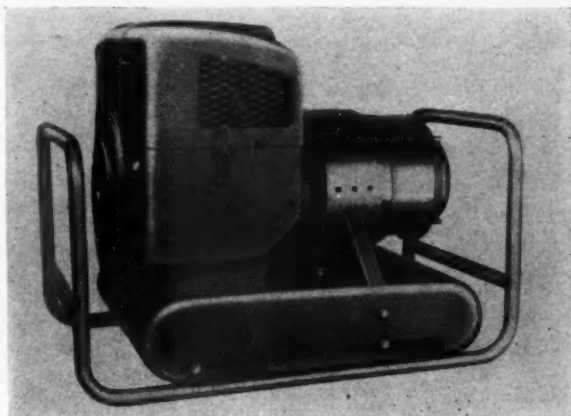
AIR Reduction Sales Company, New York, has announced the production of a new welding rod, to be known as the Airco 28 Wear-Resistant bronze welding rod, which is reported as being particularly suited for use in the railway field. The new rod is recommended by the manufacturer for use in building up wear-resistant sur-

faces that are subject to heavy loads, especially where elevated temperatures are encountered. Such applications include building up worn piston heads, valve bull rings, driving box laterals, shoes, wedges, and simi-

lar wearing parts. It is reported that laboratory tests indicate that deposits from this new rod possess high weld strength, high hardness and desistance to wear and corrosion. The Airco 28 rod is said to average 86.5 on the Rockwell B scale. The manufacturer recommends that Airco Hi-Test Flux be used with the new rod to obtain the best results.

## Onan Electric Plants

A NEW 5,000-watt electric plant weighing 272 lb., known as the 5CK-115M, has been announced by D. W. Onan & Sons, Inc., Minneapolis, Minn. This model is one of a new,



The Onan Model 5CK-115M Electric Generator Unit

improved group, available in 60 or 50-cycle alternating-current models at 2,000 and 3,000 watts, and direct-current models at 3,500 and 5,000 watts, employing the new Onan CK air-cooled, four-cycle, two-cylinder gasoline engine, as the prime mover.

Each unit embodies the CK gasoline

engine directly connected to a self-excited generator with inherent voltage regulation, and a convenient four-receptacle outlet box for direct plug-in of leads, all mounted on a single base. By means of a special winding in the generator which serves as the cranking motor, push-button starting is available on most models of both the alternating and direct-current types. A 12-volt automotive-type battery furnishes the starting power. Those models employing manual starting are equipped with a protective guard frame.

The CK line of generator plants is said to produce a high kilowatt output per pound of weight, due to the compactness in design, combined with light weight, achieved through the liberal use of aluminum parts in construction. The model 5CK-115R weighs 54.2 lb. per thousand watts, while the weight on this basis varies slightly for the other models.

Special accessories available include automatic controls, line transfer controls, dollies, gas-gasoline carburetion and underground fuel tanks.

## LeRoi "85" Airmaster

THE LeRoi Company, Milwaukee, Wis., has announced the addition of a new Model, known as the 85, to its line of Airmaster portable air compressors. Having a capacity of 85 cu. ft. per min., the new model is offered with a choice of two mountings, one consisting of two pneumatic-tired wheels (Type E), and the other of

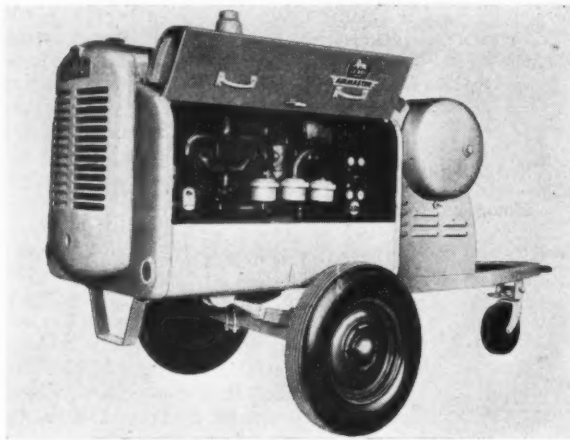
hardwood skids (Type A). Full-length tool boxes are provided with both types of mountings.

The Model 85 Airmaster is powered by the LeRoi Model D 201 valve-in-head engine with replaceable cylinder sleeves, precision bearings, pressure lubrication and magneto ignition.

The compressor is built integrally with the engine block, is liquid cooled, and also has replaceable cylinder sleeves, precision bearings and pressure lubrication, while the cylinder

The manufacturer points out the following construction features which are said to provide low cost and efficient operation: "Single-fit" design in which there is only one fit—that be-

—small, medium and large—to provide the five sizes offered. The new pumps are obtainable alone or, if desired, as complete units, each consisting of pump, V-belt and drive and electric motor, all mounted on a single, all-steel, welded base incorporating provision for belt adjustment.



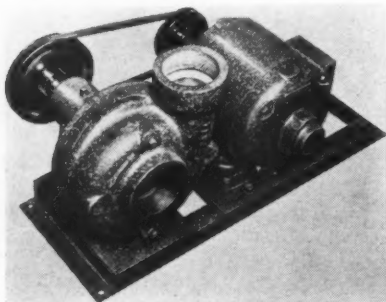
Left — LeRoi "85" Airmaster on Pneumatic Wheel Mounting

head and compressor valves are identical with those of the entire Airmaster series.

Other features of the Model 85 include regulation of air by means of the LeRoi patented Econotrol, which is said to control compressor operation automatically according to the demand for air; and electric starting and the electric Hourmeter which are supplied as standard equipment.

## Pedestal-Type Centrifugal Pumps

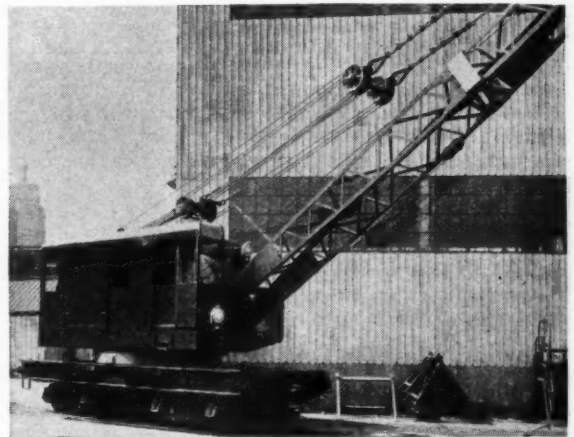
THE Allis-Chalmers Manufacturing Company, Milwaukee, Wis., has announced a line of pedestal-type centrifugal pumps, known as "Pedrif-



The "Pedrifugal" Pump Including Motor and Belt Drive

ugal" pumps, which are available in five sizes, with capacities up to 500 g.p.m. and the ability to pump against heads of as much as 100 ft. Each of these pumps embodies a pedestal containing a casing, two ball bearings on which a shaft and impeller operate, and a mechanical seal.

Right—The American Dieselectric Locomotive Crane



tween the casing and the pedestal; Texrope V-belt drive; an open bronze impeller designed to handle liquids containing a considerable volume of solids, with little or no clogging; a mechanical seal which replaces packing rings, seal cage and valve, and which is said to eliminate gland adjustment and to reduce shaft wear and scoring; ball bearings of ample capacity for either direct or belt drive, which are set in the pedestal casting, thereby, it is said, assuring positive alinement; interchangeable parts which make it possible to change one of the pumps to any other size merely by changing the impeller and the casing; a keyed shaft for both drive attachment and impeller; and bearing shaft, seal and impeller of proportions usually found in heavy-duty pumps.

Other advantages are said to include simplified maintenance, since moving parts may be removed without disturbing the pipe connections. It is said that the pump has the ability to operate in any position.

The pump is made in three basic sizes, namely, 1 in. by 1 in., 2 in. by 2 in. and 3 in. by 3 in., with the largest supplied with three different impellers

power for turning and lifting. The crane has a rated capacity of 40 tons and, in addition to hook work, is said to be adapted for use with grab bucket, grapple and magnet in all types at excavating and construction work, and for car switching on shop tracks and in material yards.

The design is based on a series of recent patents under which electric power is used for travel along the rails from a traction generator actuated by the Diesel engine. The electrified drive is said to provide for smooth, fluid starting, minimizing the strain caused by jerky starts, and to eliminate many major moving and wearing parts, a fact that is claimed to reduce maintenance as much as 50 per cent. Another patented feature is the use of electric power from the traction generator for energizing the lifting magnet, with over-excitation for maximum loading.

Cost and performance studies of this crane, covering more than 10 years of extensive field tests, are said to indicate that it will earn back its original cost at a relatively rapid rate, through economies in operation and maintenance.

## Changes in Railway Personnel

### General

**Elvyn K. Mentzer**, special engineer on the Boston & Albany, at Boston, Mass., has been appointed assistant to the general manager.

**John A. Wood**, auditor of capital expenditures of the Chicago & North Western, at Chicago, and an engineer by training and experience, has been promoted to assistant comptroller, with the same headquarters.

**R. D. Claborn**, division engineer on the Chicago, Milwaukee, St. Paul & Pacific, at Savanna, Ill., has been appointed chairman of the president's committee at Chicago.

**Frank J. Jerome**, assistant to the executive vice-president of the New York Central, at New York, and an engineer by training and experience, has been appointed to the new position of vice-president, operations and maintenance, with the same headquarters. **R. E. Dougherty**, vice-president, improvements and developments, and an engineer by training and experience, has been appointed to the new position of vice-president-assistant to the president, with headquarters as before at New York. **K. A. Borntrager**, assistant to the vice-president, at Chicago, and an engineer by training and experience, has been appointed manager of freight transportation, with headquarters at New York.

### Engineering

**G. S. Crites**, division engineer on the Baltimore & Ohio, at Baltimore, Md., has resigned to enter private practice.

**O. E. Bell**, assistant engineer in the engineering department of the Illinois Central, at Chicago, has retired after 40 years of service.

**W. B. McKenzie** has been appointed maintenance bridge engineer on the St. Louis-San Francisco, with headquarters at Springfield, Mo.

**F. N. Beighley**, roadmaster on the St. Louis-San Francisco, at Kansas City, Mo., has been appointed division engineer, Northern division, with headquarters at Fort Scott, Kan.

**H. D. Brydone-Jack**, manager of the department of personnel of the Canadian Pacific at Montreal, Que., has been appointed engineer of construction at Montreal.

**S. Schofield**, assistant engineer on the Canadian National, at Winnipeg, Man., has been appointed division engineer, Winnipeg Terminals division, succeeding **F. L. Lloyd**, who has retired.

**F. T. Kraft**, supervisor of track on the Illinois Central, at Dubuque, Iowa, has been promoted to division engineer at McComb, Miss., succeeding **E. H. Lewis**, who has been transferred to Memphis, Tenn., where he replaces **J. W. Welling**, who has retired after 47 years of service.

**R. H. Abbott**, assistant cost engineer on the Chesapeake & Ohio, at Richmond, Va., has been promoted to assistant division engineer on the Richmond division, with headquarters as before at Richmond, succeeding **E. T. Rucker**, promoted.

**L. A. Gillett**, assistant chief engineer of the Virginian, has been promoted to chief engineer, with headquarters as before at Norfolk, Va., succeeding **A. M. Traugott**, who has retired after 44 years of service.



L. A. Gillett

**H. G. Adams**, valuation engineer at Norfolk, has been appointed assistant chief engineer, succeeding Mr. Gillett. The position of valuation engineer has been abolished. **J. D. Hudson**, assistant engineer, has been appointed assistant to chief engineer. Mr. Gillett was born on March 1, 1897, at Newburyport, Mass., and was graduated from the Massachusetts Institute of Technology in 1918. After a short period of service in the U. S. Army in 1918, he began his career as a rodman for the Virginian in December, 1918. From July, 1919, to July, 1923, he served consecutively with the highway department of the state of Illinois; the Abernethy Construction Company, Boston, Mass.; the Department of Public Health of the Commonwealth of Massachusetts, and Weston & Sampson Consulting Engineers at Boston. He then joined the Florida East Coast as structural engineer at St. Augustine, Fla., leaving to serve in the same capacity for the Cincinnati Union Terminal in February, 1928. Mr. Gillett was appointed director of the federal works program in the Southwestern district of Ohio, with headquarters at Cincinnati, in 1934. He became regional director of the Federal Works Agency in 1942, with jurisdiction over six states, Midwestern region, with headquarters at Chicago. He was transferred to New York, with jurisdiction over nine Northeastern states, in 1944. He was named assistant chief engineer of the Virginian at Norfolk in February, 1946.

**George S. Wooding**, supervisor of track on the New York Central, at Gouverneur,

N.Y., has been promoted to assistant division engineer, Pennsylvania division, with headquarters at Jersey Shore, Pa., to succeed **H. B. Rutherford** who has been transferred to the Buffalo division, with headquarters at Buffalo, N.Y.

**B. E. Daniels**, assistant division engineer on the Chicago, Milwaukee, St. Paul & Pacific, at Terre Haute, Ind., has been promoted to division engineer, with the same headquarters, succeeding **M. L. Bardill**, who has been transferred to the Dubuque and Illinois division, with headquarters at Savanna, Ill., where he replaces **R. D. Claborn**, whose appointment as chairman of the president's committee, at Chicago, is reported elsewhere in these columns.

**J. E. Yewell**, engineer bridges and buildings of the Bessemer & Lake Erie at Greenville, Pa., has been appointed assistant to chief engineer, with the same headquarters. **J. W. Hopkins**, principal assistant engineer, has been appointed engineer bridges and buildings, with headquarters as before at Greenville. **Lawrence Spalding**, valuation engineer, has



J. E. Yewell

been appointed principal assistant engineer at Greenville and will continue to have charge of valuation work. The position of valuation engineer has been discontinued.

Mr. Yewell was born on June 23, 1892, at Baltimore, Md. Mr. Yewell attended Baltimore Polytechnic Institute and received his civil engineering degree from Cornell University in 1912. Entering railroad service in August, 1912, as axman on a surveying corps with the Baltimore & Ohio, he became draftsman in the maintenance of way department of the Bessemer & Lake Erie in January, 1913. One year later he transferred to the valuation department in a similar capacity, while he became chief draftsman in the maintenance of way department in April, 1917. He held the latter position until December, 1936, when he was appointed track supervisor. Mr. Yewell was appointed engineer bridges and buildings in July, 1939, which position he held until his recent promotion to assistant to chief engineer.

Mr. Hopkins was born at Philadelphia, Pa., on November 13, 1903. He attended Lehigh University and received his B.S.

C.E. degree from Pennsylvania State College in 1925. He was employed as draftsman, inspector and assistant engineer, successively, with James B. Long, Norristown, Pa., from 1925 to 1930; in the latter year he went with the Pennsylvania department of highways at Franklin, Pa.,



J. W. Hopkins

serving for six months as bridge designer and for five years as division bridge engineer. Entering railroad service in 1936 as designing engineer with the Bessemer & Lake Erie, Mr. Hopkins served as supervisor of track from June, 1939, to September, 1943, when he became principal assistant engineer.

**C. W. Reeve**, whose promotion to engineer of track on the Delaware & Hudson, with headquarters at Albany, N. Y., was reported in the July issue, was born at Philadelphia, Pa., on July 6, 1904. He received his higher education at Union college, served in the students' survey camp of the Delaware & Hudson in the summers of 1925, 1926, and 1927, and after graduation joined the bridge and building forces of the D. & H. at Carbondale, Pa. In 1929, he was appointed transitman on the Saratoga division, at Albany, N. Y., and served in that capacity until May, 1941, when he was promoted to track supervisor at Oneonta, N. Y. On January 1, 1947, he was advanced to bridge and building supervisor at that point.

**R. A. Sharood** has been appointed chief engineer of the Alaska, with headquarters at Anchorage, Alaska, succeeding **G. W. Colwell**, who has retired. Mr. Sharood was previously assistant engineer of track of the Northern Pacific at St. Paul, Minn. He was born at St. Paul, Minn., on February 25, 1904, and was graduated by Cornell University with the degree of civil engineer. He entered railroad service in 1927 as a chairman on the Northern Pacific, and served in various capacities in the engineering department of that road until 1931, when he was appointed branch line roadmaster, in which capacity he served on various territories in Montana, North Dakota and Washington. In 1934 he was promoted to main line roadmaster on the Idaho division, and in August, 1941, he was transferred to the Rocky Mountain division. Mr. Sharood entered military service in March, 1942, and was released in January, 1946. He returned to the Northern Pacific, and was appointed

assistant engineer of track, at St. Paul.

**M. Block**, assistant to the engineer of bridges of the Illinois Central, at Chicago, has been promoted to engineer of bridges, with the same headquarters, succeeding **C. C. Westfall**, whose death at Chicago on July 23 was reported in the August issue. Mr. Block was born on July 17, 1891, at Omaha, Neb., and received an engineering degree from the University of Colorado in 1912. He joined the I. C. in the latter year as masonry inspector, Northern and Southern lines, and was serving as assistant engineer at the time of World War I. Following military duty with the 47th Engineers during 1918 and 1919, Mr. Block returned to the I. C. as assistant engineer, valuation department. He held a similar position in the railroad's bridge department from 1922 to 1934, at which



M. Block

time he became chief draftsman in that department. In 1941 he was advanced to assistant to engineer of bridges.

**W. L. Anderson**, whose promotion to assistant engineer of bridges on the Chicago & North Western, at Chicago, was reported in the August issue, was born at Boone, Iowa, on July 29, 1904, and graduated by Iowa State college in 1927 with the degree of B.S. in C. E. He entered the service of the North Western on February 10, 1928, as an engineering draftsman, at Chicago, and on September 1, 1941, he was appointed office engineer. On April 1, 1944, Mr. Anderson was advanced to assistant general bridge inspector, the position he held at the time of his recent promotion.

**F. W. Hillman**, whose retirement as assistant engineer of maintenance on the Chicago & North Western, at Chicago, was reported in the August issue, was born in England on February 25, 1880, and was graduated by the University of Illinois in 1905. He entered railroad service in 1893 as an office boy in the engineering department of the Illinois Central, and served as timekeeper, chairman, rodman, and assistant engineer on construction and maintenance until 1900, when he matriculated at the University of Illinois. After graduation he was appointed assistant engineer on construction of the Illinois Central. In 1906 he became a draftsman in the office of Ralph Modjeski, consulting civil engineer. Mr. Hillman en-

tered the service of the Chicago & North Western in 1907, as a structural draftsman, and was promoted successively to assistant engineer, resident engineer, and in 1917, to division engineer, with headquarters at Madison, Wis., whence he was transferred to Chicago in 1919. In 1926 he was advanced to assistant engineer of maintenance and remained in that capacity until his retirement.

**J. W. Johnson**, whose promotion to division engineer on the Dakota division of the Chicago & North Western, at Huron, S. D., was reported in the August issue, was born in Orange County, Ind., on July 14, 1901, received his technical training at Purdue university, and entertained railroad service in 1923 as a chairman on the Illinois Central. In July, 1927, he entered the service of the Chicago & North Western as an inspector, at Green Bay, Wis., and became a draftsman at Chicago in December of the same year. From March, 1928, to July, 1937, he served as an instrumentman at Chadron, Neb., whence he was transferred to Antigo, Wis., in the same capacity. In November, 1939, Mr. Johnson was advanced to assistant engineer, Dakota division, with headquarters at Huron, S. D., the position he held at the time of his recent promotion.

**A. R. Harris**, whose promotion to engineer of bridges of the Chicago & North



A. R. Harris

Western, at Chicago, was reported in the August issue, was born at Cameron, Mo., on April 26, 1897, and received his higher technical training at the University of Missouri. He entered the service of the North Western in April, 1923, and served as engineering draftsman and designer until 1940. In the latter year Mr. Harris was promoted to office engineer, with headquarters at Chicago, and in 1941 he was advanced to assistant engineer of bridges, with the same headquarters, the position he held at the time of his recent promotion.

**J. L. Perrier**, whose promotion to office engineer, chief engineer's office, on the Chicago & North Western, at Chicago, was reported in the August issue, was born at St. Paul, Minn., on May 3, 1914, and was graduated by the College of St. Thomas, at St. Paul, in 1936. He entered railroad service in March, 1938, as a con-

(Continued on page 894)

Great Events  
Cast their  
Shadows before

ADVANCED TYPE  
WOODINGS  
RAIL ANCHOR

WOODINGS FORGE and TOOL COMPANY  
VERONA, PA. • CHICAGO, ILL.

(Continued from page 892)

crete inspector on the Chicago, Milwaukee, St. Paul & Pacific, at St. Paul. From March, 1930, to August, 1941, he served as a rodman on the Minneapolis, St. Paul & Sault Ste. Marie, at Stevens Point, Wis., and from August, 1941, to April, 1942, as field engineer and designer for Tolzt, King & Day, Inc., architects, St. Paul. Mr. Perrier entered the service of the Chicago, St. Paul, Minneapolis & Omaha (part of the North Western System) in April, 1942, as an instrumentman, at St. Paul, and in September, 1944, he was promoted to assistant engineer. In March, 1945, he was appointed assistant engineer on the North Western, at Boone, Iowa, and held that position until the time of his recent promotion to office engineer at Chicago.

**Frank Lee Nicholson**, whose retirement as chief engineer of the Norfolk Southern at Norfolk, Va., was reported in the July issue, was born at Portsmouth, Va.,



Frank Lee Nicholson

on August 12, 1868. Mr. Nicholson entered railroad service in 1887 as a rodman with the Atlantic & Danville (now the Danville division of the Southern), serving until 1889 as chainman, levelman and office assistant to chief engineer on location surveys. From 1889 to 1890, he served successively as levelman and resident engineer on construction of the Wilmington (N. C.) terminal and on what is now the New Bern branch of the Atlantic Coast Line. From January to June, 1890, Mr. Nicholson was in private practice, then becoming assistant engineer maintenance of way of the Norfolk Southern until 1892, when he was appointed acting engineer maintenance of way. From 1898 to 1909 Mr. Nicholson served as engineer maintenance of way of the Norfolk Southern, becoming chief engineer in 1909, which position he held until his retirement.

### Track

**J. H. Crenshaw** has been appointed acting roadmaster on the Atlantic Coast Line, with headquarters at Fayetteville, N. C., to succeed the late **J. L. Parker**.

**A. B. Hillman, Jr.**, assistant supervisor on the Illinois Central at Clinton, Ill., has been promoted to supervisor of track, with headquarters at Decatur, Ill., suc-

ceeding **F. E. Mayne**, who has been transferred to Dubuque, Iowa, where he replaces **F. T. Kraft**, whose promotion to division engineer, at McComb, Miss., is reported elsewhere in these columns.

**J. Contini**, roadmaster on the Canadian Pacific, at Shaunavon, Sask., has been transferred to Moose Jaw, Sask., succeeding **F. A. Young**, who has retired. **C. Wheatley**, relieving roadmaster, succeeds Mr. Contini as roadmaster at Shaunavon. **D. Shaw**, roadmaster at Outlook, Sask., has been transferred to Moose Jaw, replacing **F. Ades**, who is on sick leave. **F. Cipka**, relieving roadmaster at Moose Jaw, has been appointed roadmaster at Outlook, succeeding Mr. Shaw.

**O. M. Olson**, roadmaster on Subdivision 3 of the Dakota division of the Chicago & North Western, has been transferred to Subdivision 2, with headquarters at Brookings, S.D., succeeding **H. Diggins**, who recently retired at his own request. **Paul J. Spellman** has been appointed roadmaster of Subdivision 3, with headquarters at Redfield, S. D., succeeding Mr. Olson, and **Bernard McDermott** has been appointed assistant roadmaster, with headquarters at Clinton, Iowa.

**W. R. Benish**, assistant supervisor of track on the New York Central, at Albany, N.Y., has been promoted to supervisor of track, Subdivision 18, St. Lawrence division, with headquarters at Gouverneur, N.Y., succeeding **George S. Wooding**, whose promotion to assistant division engineer is reported elsewhere in these columns. **Francis J. Donnelly**, assistant supervisor of track on the Buffalo division, has been transferred to Albany, to succeed Mr. Benish, and **Walter Jackson**, bridge and building inspector on the Buffalo division, has been promoted to assistant supervisor of track, Subdivision 13, with headquarters at Buffalo, N.Y.

**H. S. Chandler**, supervisor of track on the Rivanna subdivision of the Chesapeake & Ohio, at Richmond, Va., has been appointed general track inspector, with the same headquarters, succeeding **W. P. Nichols**, who has been transferred to Huntington, W. Va., where he in turn replaces **W. H. Sparks**, retired. **W. T. Hazlewood**, assistant supervisor of track on the Peninsula subdivision, has been promoted to supervisor of track on the Rivanna subdivision, with headquarters at Richmond, to succeed Mr. Chandler, and **J. O. Sale** has been appointed assistant supervisor of track, succeeding Mr. Hazlewood on the Peninsula subdivision.

**P. W. Reid**, assistant supervisor of track on Subdivision 28, Electric division, New York Central, at New York, has been transferred to Subdivision 3, Eastern division with headquarters at Poughkeepsie, N.Y., to succeed **William Rinaldi**, whose death is reported elsewhere in



these columns. **C. L. Campman**, assistant supervisor of track at Weehawken, N.J., has been transferred to the Electric division, succeeding Mr. Reid, and **J. G. Raimondi**, track foreman, has been promoted to assistant supervisor of track on Subdivision 20, River division, with headquarters at Weehawken, to succeed Mr. Campman. **Frank Corrigan**, assistant supervisor of track on Subdivision 22, has been transferred to Subdivision 7, Mohawk division, with headquarters at Utica, N.Y., and **G. D. Campman**, work train foreman, has been promoted to assistant supervisor of track, Mohawk division, with headquarters at South Schenectady, N.Y., succeeding Mr. Corrigan.

**W. H. Sparks**, general track inspector on the Chesapeake & Ohio, at Russell, Ky., has retired.

Mr. Sparks was born at Concord, Ky., on October 10, 1871, entered the service of the Chesapeake & Ohio in 1886 as a water boy



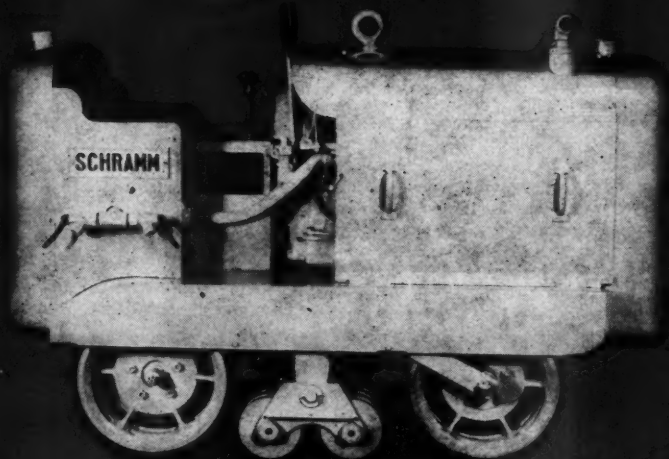
W. H. Sparks

at Concord, and served in various capacities in the track department until August, 1897, when he was appointed section foreman at Riverton, Ky. Nine years later, in August, 1906, he was promoted to supervisor of track, with headquarters at Russell, Ky., where he served until 1917, when he was appointed track inspector. In 1924, Mr. Sparks was advanced to general inspector of track, the position he held at the time of his recent retirement, after 60 years of service on the Chesapeake & Ohio. For many years Mr. Sparks has been a prolific contributor to the "What's The Answer" section of *Railway Engineering and Maintenance*. In 1945 he was elected to honorary membership in the Roadmasters' and Maintenance of Way Association of America.

### Bridge and Building

**F. W. Hutcheson**, assistant supervisor of bridges and buildings on the Chesapeake & Ohio, at Newport News, Va., has been promoted to supervisor of bridges and buildings on the Norfolk Terminal division at Newport News, to succeed **C. C. Laeke**, retired. **G. B. Harris**, assistant engineer at Richmond, Va., has been appointed assistant general supervisor of bridges and buildings, with headquarters as before at Richmond, to succeed **S. H. Poore**, promoted.

(Continued on page 896)



Over-all length.....76 inches  
Over-all width.....32 inches  
Height.....55 inches  
Weight.....2650 pounds

# **SCHRAMM** *leads the trend* **TOWARD SMALL MOBILE COMPRESSORS** *with the* **NEW MODEL 60 CRAWLER**

EXHIBITOR

BRIDGE & BUILDING  
TRACK SUPPLY

2001, 2002, 2003, 2004  
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Maintenance engineers who want utility and flexibility like small 60 foot compressors because they pack ample power for four tampers and are just right for spot tamping, yet adding more units makes them adaptable to larger jobs.

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# **SCHRAMM**

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**THE COMPRESSOR PEOPLE  
WEST CHESTER  
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(Continued from page 894)

**Dan McLeod McKenzie** bridge and building master on the Edmonton division of the Canadian National at Edmonton, Alta., has retired.

**G. E. Gassner**, bridge inspector on the Central of Pennsylvania, at Mauch Chunk, Pa., has been appointed master carpenter to succeed **A. J. Herman**, retired. **Leonard McGovern** has been appointed bridge inspector, succeeding Mr. Gassner.

**C. W. Schlosser**, whose appointment as acting supervisor of bridges and buildings on the Pittsburgh & Lake Erie, at Pittsburgh, Pa., was reported in the February issue, has been appointed supervisor of bridges and buildings there, to succeed **Jesse A. Noble**, whose death is reported elsewhere in these columns.

### Obituary

**C. C. Westfall**, engineer of bridges of the Illinois Central, at Chicago, whose death in that city on July 23 was reported in the August issue, was born at Bushnell,



C. C. Westfall

Ill., on July 14, 1886, and was graduated by the University of Illinois in 1907 with the degree of B.S. in C. E. He entered the service of the Illinois Central in 1907 and served until 1911 as draftsman and designer in the bridge and building department. From 1911 to 1913 he served as inspector and field engineer on concrete construction and track elevation. After a year's service as chief engineer, construction, of the Midland Continental, Mr. Westfall returned to the Illinois Central in 1914 as draftsman and assistant engineer in the bridge department. In 1915 he was advanced to engineer of bridges, the position he held at the time of his death.

**Jesse A. Noble**, retired supervisor of bridges and buildings on the Pittsburgh & Lake Erie, at Pittsburgh, Pa., died on July 31.

**John F. Shafferman**, retired track supervisor on the Baltimore & Ohio, died recently at Fairmont, W. Va. He was 87 years old.

**L. H. Roden**, assistant engineer of the Chesapeake & Ohio, with headquarters at Richmond, Va., died in that city on July 2.

## Association News

### American Welding Society

The twenty-eighth annual meeting of the society will be held at the Hotel Sherman, Chicago, during the week of October 19. Features of the program which will be of particular interest to railway engineering and maintenance officers include the following addresses—both of which will be presented on Monday, October 20:

End-Hardening of Rails and Open-Hearth Frogs, by R. W. Torbert, assistant to vice-president, Oxweld Railroad Service Company.

New Developments in Railroad Maintenance of Way Work, by C. A. Daley, maintenance engineer, Air Reduction Sales Company.

### American Railway Engineering Association

A total of 15 committees have scheduled meetings to be held during September, of which 9 will be held at Chicago during the concurrent conventions of the Roadmasters' association and the American Railway Bridge and Building association at the Stevens Hotel, September 16-18. These 9 committees include those on Roadway and Ballast, which will meet on September 15 and 16; Wood Bridges and Trestles, September 16; Maintenance of Way Work Equipment, September 16; Clearances, September 16 and 17; Rail, September 17; Water Service and Sanitation, September 17; Buildings, September 17 and 18; Records and Accounts, September 17 and 18; and Track, September 18. All of these meetings are to be held at the Stevens Hotel except those of the Committees on Wood Bridges and Trestles and Water Service and Sanitation, which will be held at the association's headquarters at 59 E. Van Buren St., Chicago.

Four other of the committee meetings will also be held at Chicago as follows: Uniform General Contract Forms on September 8 and 9, Highways on September 9 and 10, Economics of Railway Labor on September 19, and Economics of Railway Location and Operation on September 24 and 25. All of these will be held at the association's headquarters except that of the committee on Economics of Railway Location and Operation, which will meet at the Chicago Engineers' Club. The only September committee meetings to be held outside of Chicago are those of the Committee on Ma-

sonry, which will meet at Niagara Falls, Ont., on September 8 and 9, and that of the Yards and Terminals committee, which will meet at Buffalo, N.Y., on September 8, 9 and 10.

At a meeting of the Board of Direction, held on August 12, it was decided to place before the membership, by means of a letter ballot to be mailed on September 1, a proposal for increasing the dues of Members and Associates from \$10 to \$15, and of Juniors from \$5 to \$7.50.

### Railway Tie Association

The twenty-ninth annual convention of the association will be held on September 23-25, at the Arlington Hotel, Hot Springs, Ark. The program of the three-day meeting will contain a large number of addresses and committee reports, many of which will be of direct interest to railway maintenance officers. Among the addresses in this category to be presented on the first day, Tuesday, September 23, is one on the "Needs of the Railroads For Crossties in the Next 12 Months" by C. Miles Burpee, vice-president, Simmons-Boardman Publishing Corporation, New York; another on "The Railroads' Economic Outlook For the Next 12 Months" by C. E. Johnston, chairman, Western Association of Railway Executives, Chicago; and a third on the "Trend of Production of Crossties" by T. J. Turley, Jr., Bond Brothers Company, Louisville, Ky. The report of the Committee on Checking and Splitting of Crossties will also be presented at the Tuesday session.

The program on Wednesday will include an address on "What the Railroad Foresters Are Doing" by James Spiers, forester, Central of Georgia, Savannah, Ga.; and an address on "Research on Wood For Railroad Use" by Dr. Reavis C. Sproull, Southern Research Institute, Birmingham, Ala.

Highlights of the Thursday session will be addresses on "Timber Resources of the United States and What They Mean In (Continued on page 900)

### Meetings and Conventions

**American Railway Bridge and Building Association**—Annual meeting, September 16-18, 1947, Hotel Stevens, Chicago.

**American Railway Engineering Association**—Annual Meeting, March 16-18, 1948, Chicago.

**American Wood-Preservers' Association**—Annual meeting, April 27-29, 1948, St. Paul, Minn.

**Bridge and Building Supply Men's Association**—Joint exhibit with Track Supply Association, September 15-18, Hotel Stevens, Chicago, during concurrent conventions of American Railway Bridge and Building Association and Roadmasters' Association.

**Maintenance of Way Club of Chicago**—Next meeting, October 27, 1947.

**National Railway Appliances Association**—Thirty-third annual exhibit, Chicago, March 15-18, 1948, in connection with A.R.E.A. convention.

**Railway Tie Association**—Annual meeting, September 23-25, 1947, Arlington hotel, Hot Springs, Ark.

**Roadmasters' and Maintenance of Way Association of America**—Annual meeting, September 16-18, 1947, Hotel Stevens, Chicago.

**Track Supply Association**—Joint exhibit with Bridge and Building Supply Men's Association, September 15-18, Hotel Stevens, Chicago, during concurrent conventions of Roadmasters' Association and American Railway Bridge and Building Association.



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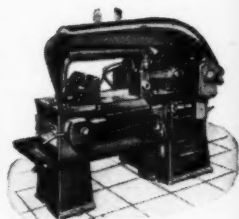
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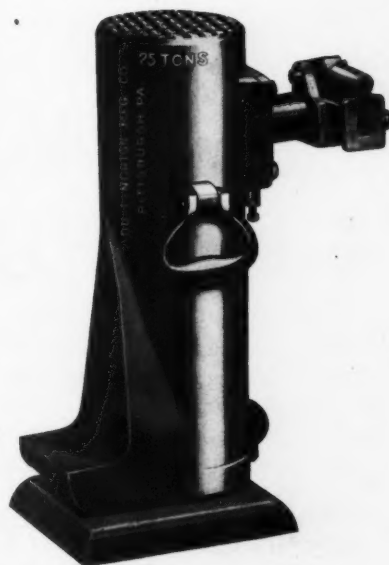
**A**FTER 22 years of taking jacks apart—checking them for wear, replacing worn or broken parts—I have learned what makes one kind better than another. I see how the good design and workmanship of Duff-Norton Jacks prevents trouble.

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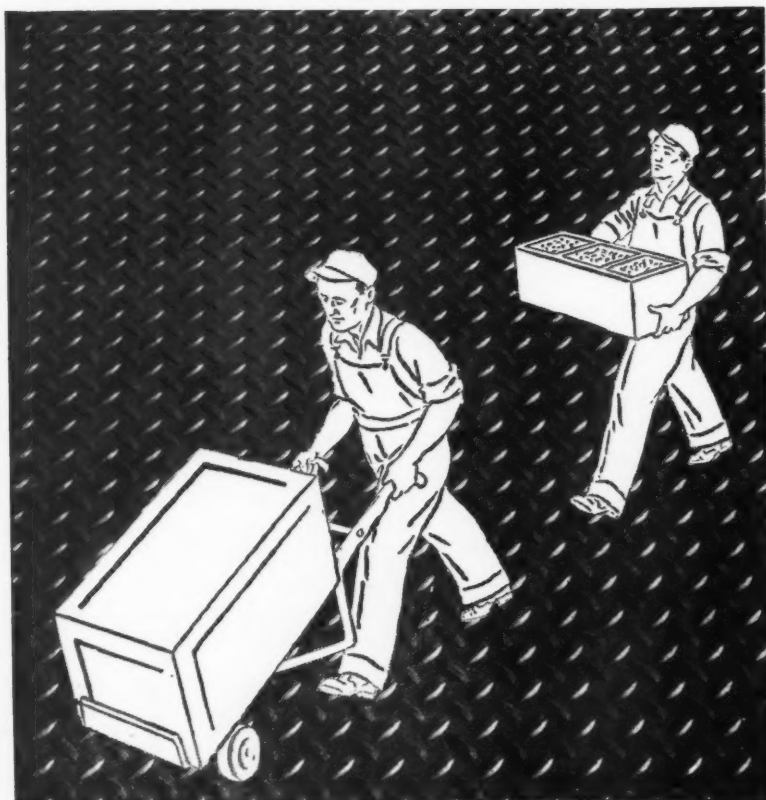
and cleaner design. That's what saves time in the repair shop.

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(Continued from page 896)

Crossties," by Edward C. Crafts, chief, Division of Forest Economics, Forest Service, U. S. Department of Agriculture, Washington, D. C.; on "The Future Timber Supply," by C. D. Turley, engineer, ties and treatment, Illinois Central, Chicago; and on "Factors That Enter Into the Cost of a Crosstie," by B. N. Johnson, Koppers Company, Richmond, Ind.

## Supply Trade News

### General

The **Air Reduction Sales Company** has announced the opening of a new acetylene plant in Dayton, Ohio, with **R. K. Haygood** as plant superintendent.

The **L. B. Foster Company** has announced the opening of offices and warehouses at Houston, Tex. **Jerome B. Strauss** has been appointed manager, with offices at 1016 Walker avenue, Houston.

**Mason E. Kline** has announced the formation of **M. E. Kline & Co.**, at 625 Market street, San Francisco, Cal. He resigned recently as vice-president and general sales manager of the Union Lumber Company. The new company will make wholesale distribution of railroad and industrial forest products, with special emphasis on lumber, timber, ties, poles and piling.

**W. F. Munnikhuysen**, vice-president of **Koppers Company, Inc.**, and general manager of the company's Wood Preserving Division, has announced that the company is ready to build "made-to-measure" highway trestle bridges of pressure-treated timber in six of its wood preserving plants. The announcement says that "factory-tailored" spans can be shipped to the site, piles driven, and the bridge assembled in record time. A booklet describing the new bridges is available.

### Personal

**Frank E. Carroll**, structural engineer has joined the engineering department of the **Timber Engineering Company**.

**Charles E. Nelson, Jr.**, director of purchases and production planning for the **Waukesha Motor Company**, also has been appointed assistant to the president, a newly-created position.

**Albert Musschoot**, a member of the general engineering staff of the **Link-Belt Company**, at Philadelphia, Pa., has been appointed assistant to the chief engineer, with headquarters at the company's general office, 307 North Michigan avenue, Chicago.

**W. I. Galliher**, executive sales manager of the Columbia Chemical Division of the **Pittsburgh Plate Glass Company**, has also been appointed executive sales manager of the **Southern Alkali Corporation**, a subsidiary of Pittsburgh Plate Glass.

(Continued on page 902)

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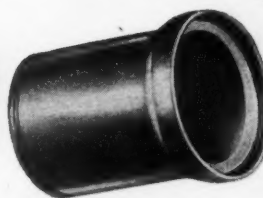
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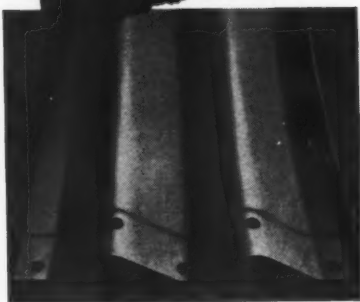
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(Continued from page 900)

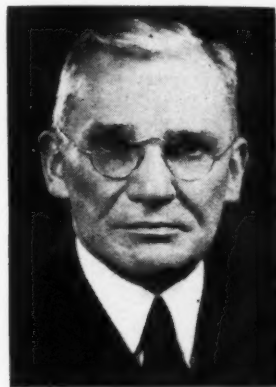
**E. W. Backes**, whose promotion to railroad industries sales manager of the consolidated sales organization of the Carnegie-Illinois Steel Corporation (a subsidiary of the United States Steel Cor-



**E. W. Backes**

poration), with headquarters at Chicago, was reported in the August issue, was born in New York and received his higher education at Pennsylvania Military College and at Yale University. He entered the service of Carnegie-Illinois in 1940, and was appointed assistant manager of sales for railroad materials on January 1, 1946. Previously he had served in sales engineering in the railroad material and commercial forgings division of the Chicago general sales organization.

**J. V. Smith**, whose election as president of Hubbard & Co., Pittsburgh, Pa., was reported in the July issue, was born at Brooklyn, N. Y., on February 13, 1884, ran away from high school at fourteen, and secured a position as office boy with



**J. V. Smith**

the Oliver Brothers Purchasing Company, New York, with which company he remained seventeen years, the last four as manager of the Pittsburgh office. More than thirty years ago he became manager of Hubbard's shovel business. In 1924 Mr. Smith was assigned to develop the company's Pacific Coast factory, after the completion of which he returned to Pittsburgh, and was appointed vice-president in charge of pole line in 1929. In 1943 he

(Continued on page 904)

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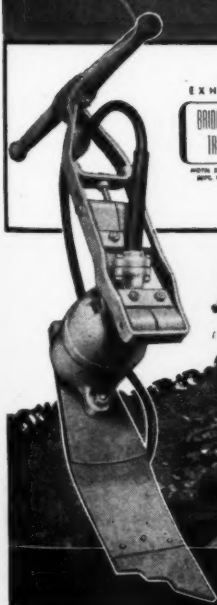
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  - ★ CENTRAL OF GEORGIA
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For heavy duty work.  
Height Closed 24"  
Rise 17". Wt. 98 lbs.

**\$33.50 EACH**  
\$31.50 lots of 6;  
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List price \$132.00  
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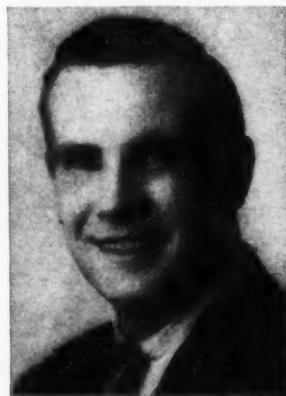
1416 Harrison Avenue

Cincinnati 14, Ohio

(Continued from page 902)

was elected executive vice-president, the position he held at the time of his recent election to the presidency.

George M. Snyder, whose appointment as executive metallurgist of the Woodings-Verona Tool Works, with headquarters at Verona, Pa., was reported in the August issue, was born in Verona on



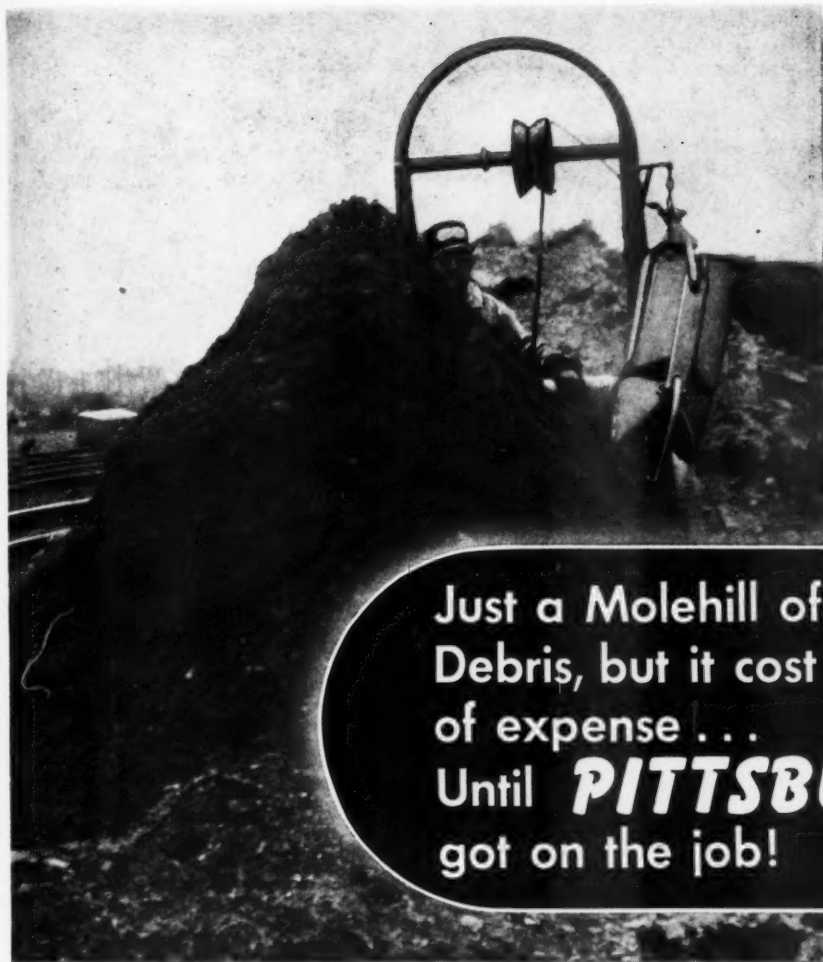
George M. Snyder

June 16, 1916, and received his higher education at the University of Pittsburgh. He holds a B.S. degree in chemical engineering and an M.S. degree in metallurgical engineering. Mr. Snyder began his career as a chemical engineer for the Celanese Corporation of America at Cumberland, Md., and in 1939 joined the Carnegie-Illinois Steel Corporation at its Homestead (Pa.) plant. Prior to leaving the Homestead plant of Carnegie-Illinois, Mr. Snyder was heat-treating procedure foreman and supervisor of tool steel. Late in 1945 he was transferred to the company's general offices as a senior metallurgist, specializing in heat-treating problems and held that position at the time of his recent appointment as executive metallurgist.

George P. Fisher, director of personnel of the Whiting Corporation, Harvey, Ill., has been elected also a vice-president of the company. A. J. Grindle, manager of the foundry equipment department, has been elected vice-president in charge of foundry equipment sales, and J. Clyde Thomas, treasurer, has been made secretary and a director of the firm. Mr. Thomas succeeds R. A. Pascoe, who has resigned. Stanley M. Steinko has been re-elected controller and elected assistant secretary.

M. L. Noel, whose appointment as vice-president and general sales manager of the Tractor division of the Allis-Chalmers Manufacturing Company was reported in the July issue, joined Allis-Chalmers in 1928, following his graduation by the Texas Agricultural and Mechanical College, and in 1929 he became service manager for one of the company's tractor lines. In 1930 he served as assistant sales manager for industrial wheel tractors, and then spent a year at Dallas, Tex., as a salesman. Mr. Noel was appointed industrial district manager at Rockford, Ill., in

(Continued on page 906)



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Debris, but it cost a mountain  
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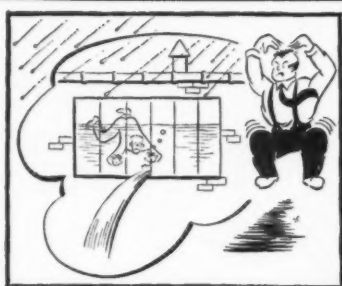
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Please send information about STONHARD ROOF RESURFACER and a free copy of "Over the Rough Spots."

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Mr. .... Title .....

Address .....

City..... Zone..... State.....

(Continued from page 904)

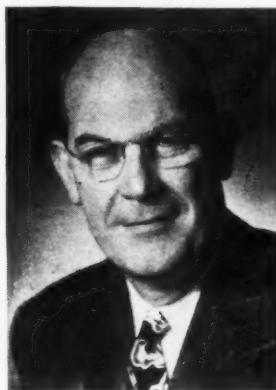
1932, and two years later he was promoted to assistant manager of industrial sales. In 1938 he was appointed manager of industrial sales, and in 1945 he was ad-



M. L. Noel

vanced to general sales manager of the tractor division.

J. L. Singleton, whose appointment as vice-president and director of sales of the General Machinery division of the Allis-Chalmers Manufacturing Company was reported in the July issue, graduated from



J. L. Singleton

Alabama Polytechnic Institute, joined Allis-Chalmers in 1926, and served in various departments before going to the Denver (Colo.) district office, where he remained for twelve years, the last four as manager. In 1942 Mr. Singleton returned to the West Allis works as assistant manager of the steam turbine department. In 1945, after serving for a short period as assistant manager, he was advanced to manager of the district sales offices of the general machinery division, the position he held at the time of his recent appointment.

L. A. Weom has been appointed manager of the Pump division of Fairbanks, Morse & Co., with headquarters at Chicago, succeeding Arnold Brown, who has resigned. Mr. Weom joined the company in January, 1929, as an assistant in the pump and electric department of the company's branch at St. Paul, Minn. Early in 1932 he

became a field engineer covering South Dakota and western Minnesota. In 1936 he was promoted to manager of the pump and electric department at St. Paul, the position he held at the time of his recent appointment.

## Trade Publications

(To obtain copies of any of the publications mentioned in these columns, use postcards, page 829)

**Allis-Chalmers Products for Heating, Ventilating, and Air Conditioning**—The Allis-Chalmers Manufacturing Company has just published a new 12-page bulletin, No. 25B6183, which describes the company's Texrope V-belt drives, centrifugal pumps, a-c and d-c motors, motor control equipment, dry-type transformers, and a-c and d-c welders. Every page of this bulletin carries illustrations of installations or separate items of equipment.

**Products of Eaton**—The Eaton Manufacturing Company has issued the new 1947 edition of its booklet—Products of Eaton—a well-illustrated prospectus of the complete line of the company's products. This edition includes a number of developments not shown in the 1946 edition, notably the Dynamatic dynamometers, oil-well draw works brakes, and vehicle fan drives. Up-to-date product photographs make this booklet a complete presentation of all Eaton products and divisions.

**Soil Erosion Control**—The American Steel & Wire Co. has issued an 18-page booklet entitled "It's Your Top Soil" and designed to help those confronted with problems of soil erosion and conservation. The booklet describes the principal types of erosion and the appropriate methods of control. Topics of discussion include contour plowing, terracing, strip cropping, gully elimination, crop rotation, and woods preservation. Numerous photographs and sketches show examples of erosion and the methods of control employed to restore the land.

**Small Tournapull**—R. G. Le Tourneau, Inc., has published a large folder, No. TP-136, illustrating and describing the company's new small Tournapull. This large folder, which opens to 23 in. by 33 in., explains, by means of text and illustration, the design features built into the new Tournapull, which is designed for use on small maintenance-type yardage projects. The inside spread gives general specifications, Tournapull specifications, Carry-all specifications, and estimated production in yards per hour. Two small pamphlets accompany the large folder—the announcement folder No. TP-138 and the application folder No. TP-134.

**Caterpillar Diesel Tractors**—The Caterpillar Tractor Company has published two folders describing the power and work features of its models D6 and D4 Diesel tractors. Both folders emphasize the salient features of design and manufacture, and include specifications of the machines. They are well equipped with graphic illustrations of important components and major applications.



## KEEP YOUR TRAFFIC MOVING *with the JORDAN*



Keep your roadbed well drained—necessary for modern high speed traffic.  
Keep your lines and classification yards open when the snow flies.

- the Jordan does *both* jobs—an all-year mechanized maintenance crew—tireless, efficient, wholly dependable.

To see this versatile machine at work, get the *Jordan Book*—many action photographs. Write us.

# O. F. JORDAN COMPANY

WALTER J. RILEY, President

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- It Rides on Rubber
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Fast, versatile industrial crane with plenty of LIFT ability . . . ideal for moving castings, steel, scrap, coal, lumber or even machine tools. Travels anywhere . . . on paved surfaces, cinders or just plain mud . . . gets there in a hurry. Available with crane hook, clamshell, or magnet . . . quickly convertible to any other attachment. Operated by *ONE* man . . . powered by *ONE* engine . . . controlled from *ONE* position in cab.

Features include: Hydraulic steering . . . Air-actuated hydraulic brakes . . . One-piece cast gear case completely encloses and oil-seals all working parts. *FULL VISION CAB*, pioneered by UNIT, provides 360° visibility for greater safety and efficiency.



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and all year round general maintenance.

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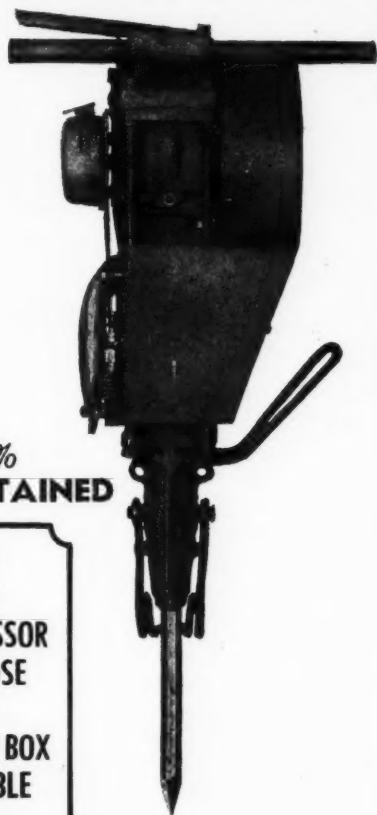
- **pumps** for wells, lakes, rivers, reservoirs, irrigation—or for any use where large quantities of water must be produced at low cost. Sizes range from 40 to 16,000 gallons per minute. Write for Layne Pump Catalog.

## LAYNE WELL WATER vertical turbine pumps **SYSTEMS**

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**100%  
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OR HOSE  
NO  
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OR CABLE  
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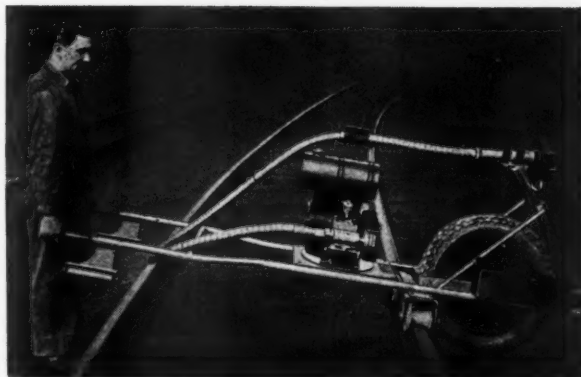
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Busting concrete — Digging clay and shale  
Cutting asphalt — Tamping backfill and a  
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Model P-40 Portable Flexible-shaft Grinder

## SEE NEW RTW TRACK MACHINES

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TRACK SUPPLY ASSOCIATION CONVENTION  
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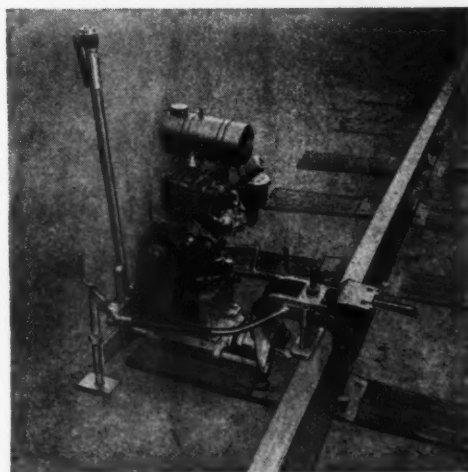
**SEPT. 15-18**

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**Booths 153-155**

**Railway Trackwork Co.**

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Model P-34-A Power Track Drill



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The versatility, speed and stamina built into every BURRO make it a natural for hundreds of odd jobs around the yard, in the stores department or on the line. Equally efficient with clamshell bucket, magnet, hook, drag-line bucket or rail tongs, BURRO is always busy—saving time and costs on every job.

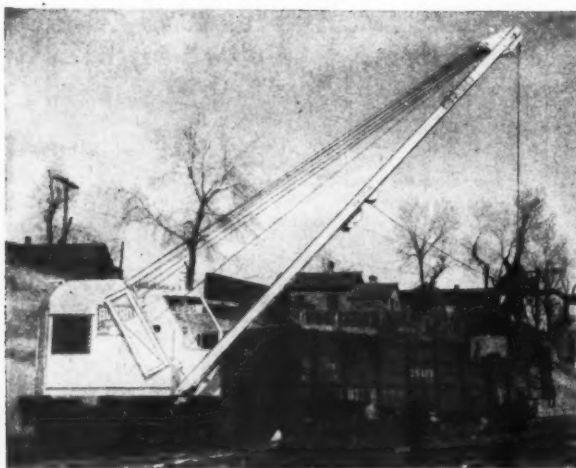
Fast travel speeds get the BURRO from one job to another in a hurry—its heavy draw bar pull enables it to haul its own work train. Watch a BURRO work—see why it's the busiest crane on the track.

Write for Bulletins

EXHIBITOR

BRIDGE & BUILDING  
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SEP. 13-16-17-18, 1947



**CULLEN-FRIESTEDT CO.,**  
1301 S. KILBOURN AVE. CHICAGO, ILLINOIS



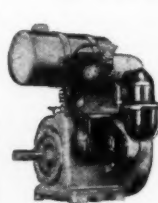
Combination scoring and tie-cutting machine, made by the Woolery Machine Co., Minneapolis, Minn. This unit is powered by a Wisconsin 4-cycle single cylinder engine.

## for most H. P. Hours of ON-THE-JOB Service Specify **WISCONSIN** *Air-Cooled* **ENGINES**

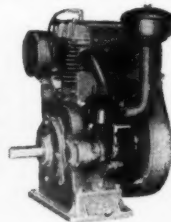
Whether the job calls for scoring or cutting ties with the Woolery combination rig illustrated above . . . or any one of a great number of power jobs that are always waiting to be done in railway maintenance service . . . you will always be sure of the most machine-hours of productive work if your equipment is Wisconsin-powered.

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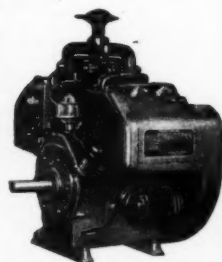
Specify "Wisconsin Engines" for the most Hp. Hours of on-the-job service.



Models AB and AK  
4-cycle single cyl.  
engines available in  
2 to 4 hp. sizes.



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4 to 9 hp.



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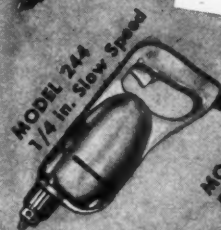
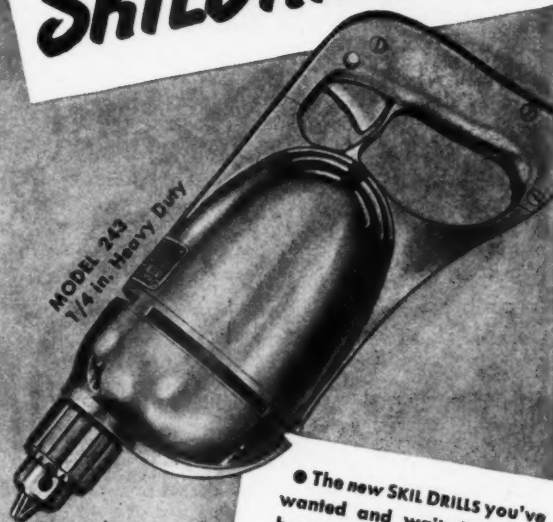
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\*SKIL DRILLS are made only by SKILSAW, INC.

## SKILTOOLS

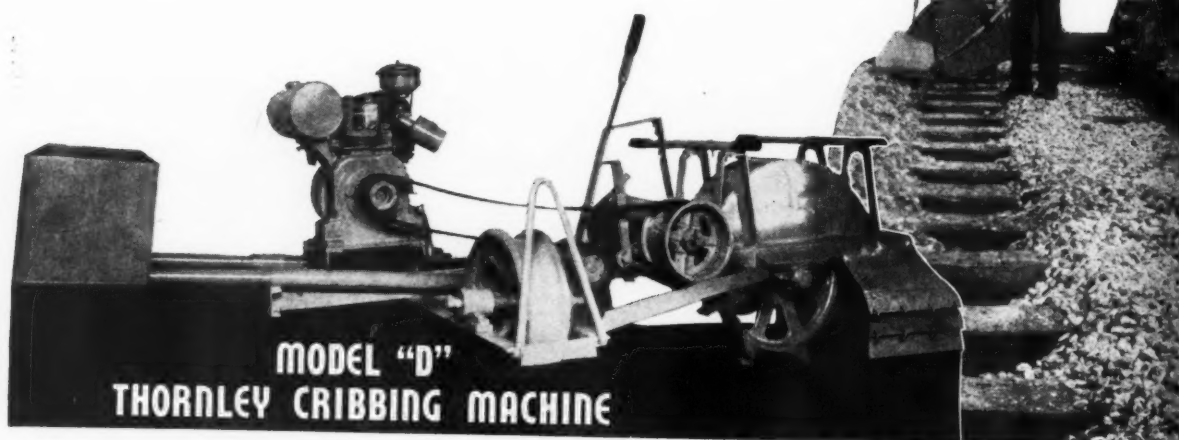
# FASTER - BETTER - CHEAPER cribbing jobs with this machine

This efficient machine is now in practical use on several major railroads. It travels along one rail just ahead of the tie-azding machine, clearing the crib ballast so it will not foul the adzer bits. By hand labor methods this job requires several men; only one man is needed to operate the Thornley Cribbing Machine.

Powered by a 6 h.p., 4-cycle engine using combination chain and belt drive. Double-flanged pressed steel wheels. Drive chain in oil-tight case. Telescoping counterbalance. Steel cribbing wheel mounts 8 heavy alloy steel blades.

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**MODEL "D"**  
**THORNLEY CRIBBING MACHINE**

**These familiar symbols represent more than  
126 thousand miles of America's finest railroads  
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**Almost every time you travel by rail  
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Clamshell BUCKETS

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## Makes Tracks Last Longer

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### Mall Portable Rail Grinder

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Where MALL Rail Grinders keep rails and switchpoints in fighting trim, you'll find longer rail life, better fitting and acting switches, less rail and road bed maintenance, plus reduced shock on rolling equipment.

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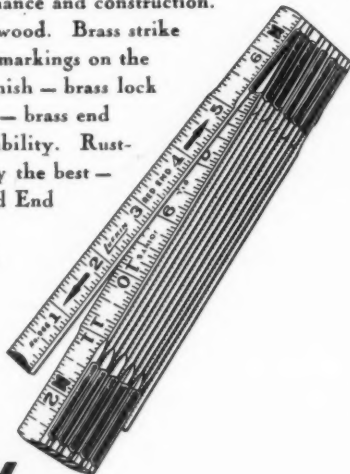
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**NO DRILLING!**

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**COMPLETELY SAFE!**  
WHEN USED IN ACCORDANCE WITH INSTRUCTIONS

**EASY TO USE—**  
CUTS WORKER FATIGUE

**THOROUGHLY TESTED**  
ON MANY JOBS

**PRINCIPLE OF OPERATION**

Tempotool employs the power of an exploding cartridge to drive "holding studs" into steel or concrete. The tool is fired by pushing the muzzle of the tool sharply against the work.

Tempotool projectiles have a thin flange around the edge of the head which shears off when the tool is fired. This flange, by momentarily confining the gases of the explosion, builds up the terrific pressure which gives the projectiles their high velocity. Despite this power, recoil is amazingly light.

**TYPICAL PROJECTILES USED BY TEMPOTOOL**

- DRIVE PIN
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Other type studs made to order for special jobs.

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**INTRODUCING A NEW ERA IN HAND TOOLS**

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*Formerly Supervisor on the Pennsylvania Railroad*



The proved accuracy of these methods has caused them to be accepted as standard practice on many roads. Complex algebraic and geometric calculations are reduced to their simplest form and as nearly as possible to terms of simple arithmetic. Application of these calculations to the actual job is made plain by brief explanations. Drawings clarify and make the meaning of the text unmistakable. Tables of dimensions and graphs still further meet the practical needs of track foremen.

### CONTENTS

Curves: The Relining of Curves with a String—Preliminary Study of the Curve—The Solution of String Lining Problems—Super-elevation of Curves—The Spiral—The Vertical Curve—Economics of Curves—Practical Switch Connections: Essential Elements in the Design of Switch Connections—Rules for Computing Switch Dimensions—Rules for Various Functions of Turnouts—Practical Considerations in Installing Turnouts—Methods in Installing and Maintaining Switches—Siding Location: Simplified Field Work—Special Practices.

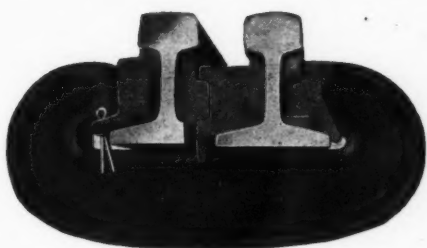
1947. 5th. 212 pages, 24 illus., index. 5 x 7, flexible. \$3.00

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One size of yoke is suitable for a range of rail sections which simplifies and reduces your store room stocks.

See this clamp at the September exhibition.

EXHIBITOR

BRIDGE & BUILDING  
TRACK SUPPLY

NOTE: EXHIBIT, CHICAGO  
SEPT. 15-20-27-28, 1947

## THE Q AND C COMPANY

Chicago 5

New York 6

St. Louis 1

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Sealtite Car Bolt

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Railway Engineering and Maintenance

For additional information, use postcard, pages 829-830

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**UP TO 31% EASIER LIFTING**  
Shorter fulcrum center reduces effort needed to lift load.

**LOWER MAINTENANCE**  
New Pin-Type pawl and socket construction prevents grit accumulation... reduces wear 81%.

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4 SIZES... 15-TON CAPACITY

215A	5" LIFT
216A	8" LIFT
217A	13" LIFT
218	19 1/4" LIFT

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Jacks

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The "US" line is complete—Gasoline and Diesel units from 1/2 to 140 kw. AC or DC. Compact Portable units... dependable Stand-by units... and rugged units for Continuous Duty.

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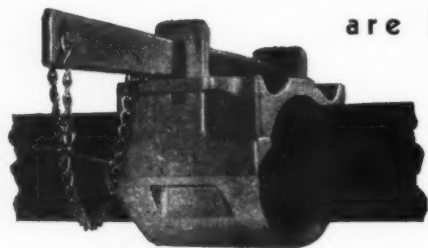
September, 1947

915

# Presto-Lock FLEXIBLE PIPE COUPLINGS

are in use on many railroads

Installation Time: 9 Seconds



Presto-Lock FLEXIBLE PIPE COUPLINGS are ideal for both temporary and permanent installations on air, water, steam and oil pipe lines.

Presto-Lock FLEXIBLE PIPE COUPLINGS afford maximum utilization of compressors without the necessity of moving them, by using temporary pipe lines more than a mile in length.

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Be sure to see our exhibit at Booth 49 during the Roadmasters' Convention.



## DRINKWATER, Inc.

WAUKEGAN, ILLINOIS

### ALPHABETICAL INDEX TO ADVERTISERS, SEPTEMBER, 1947

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Blaw-Knox Company	913	Lewis Bolt & Nut Co.	915	Syntron Co.	909
Byrd-White Construction Co.	902	Lufkin Rule Company, The	914	<b>T</b>	
<b>C</b>		<b>M</b>		Taylor Colquitt Co.	828
Chicago Pneumatic Tool Company	853	Maintenance Equipment Company	839	Templeton, Kenly & Co.	915
Cullen-Friedstedt Co.	910	Mall Tool Company	913	Tempo Products Company	914
<b>D</b>		Master Builders Co., The	846	Texas Company, The	814
Dearborn Chemical Company	813	Michigan Power Shovel Company	822	The Shovel Company, The	840
Diaston & Sons, Inc., Henry	850	Morden Frog and Crossing Works	912	Thornley Railway Machine Co.	912
Dowell Incorporated	831	<b>N</b>		Timken Roller Bearing Company, The	817
Drinkwater, Inc.	916	National Clay Pipe Manufacturers, Inc.	901	Track Maintenance Specialists	908
Duff-Norton Manufacturing Co., The	899	National Lead Company	824	<b>U</b>	
<b>E</b>		National Lock Washer Company, The	917	Union Metal Manufacturing Company, The	820
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Eclipse Air Brush Co.	914	Northwest Engineering Company	815	Unit Rail Anchor Company, Inc.	835
Electric Tamper & Equipment Co.	903	<b>O</b>		United States Motors Corp.	915
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Fairbanks, Morse & Co.	823	<b>P</b>		Warner & Swasey Co., The	836-837
Fairmont Railway Motors, Inc.	858	P. & M. Co., The	897	Western Waterproofing Company	911
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<b>H</b>		Pittsburgh Plate Glass Company	834	Woodings Forge and Tool Company	893
Homelite Corporation	852	<b>Q</b>		Woolery Machine Company	816
Hubbard & Co.	835-898	Q and C Company, The	915	Worthington Pump and Machinery Corporation	918
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Independent Pneumatic Tool Company	843	Racine Tool and Machine Co.	898		
Industrial Brownhoist Corporation	825	Rail Joint Company Inc., The	811		
Ingersoll-Rand	854				
Inland Steel Co.	900				
International Harvester Company	826				

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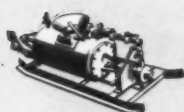
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